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ROBERT T. KE
Director
Tel. 722-410

roject No. 164-SD-1-70

Date October 3, 1969

OFFICIAL NOTICE OF SUBMITTAL
OF
STATEMENT OF FUNCTIONAL REQUIREMENTS

o William Ohrenberger
Superintendent of Public Schools
Boston School Department
15 Beacon Street
Boston, Massachusetts 02108

Section 4, Chapter 642 of the Acts of 1966, establishing the Public acilities Department states, in part, that no preliminary study for any tructure or facility shall be approved by the Public Facilities Commission nless a statement of functional requirements relative to such structure or acility and such preliminary studies shall have been submitted by the irector to every Board, Officer, Authority or Body to use such structure or acility in the first instance nor until each such Board, Officer, Authority or ody has filed with the Director written comments with respect thereto or ourteen days (or such longer period as the Director in such notice may pecify) have elapsed after the Director's delivering such notice without eceiving such comments.

In conformity with these statutory provisions, as Director of ublic Facilities, I am hereby submitting to you a statement of functional equirements, entitled "The New Georgetown Elementary School in West Roxbury"

ted June 12, 1969, for the project at Fensmere Road and West Boundary
oad, West Roxbury.

own as the New Georgetown Elementary School

The written comments on the aforenamed statement of functional requirements hall be used in conjunction with an Official Notice of Preliminary Studies commendation, (to be submitted to you at a later date) for action by the blic Facilities Commission in

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Under the above-cited statutory provisions your written comments on the statement of functional requirements must be received by me not later than October 20, 1969.

Very truly yours,

Robert T. Kenney

Director of Public Facilities

This is to certify that I delivered the original of the foregoing otice in hand to Mary C. Lally

n Oct. 3, 1969 at 15 Beacon St

Signed: Sture Viklund

EDUCATIONAL CONCEPTS UPON WHICH THE DESIGN REQUIREMENTS FOR THE NEW ELEMENTARY SCHOOL ARE BASED

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EDUCATIONAL CONCEPTS UPON WHICH THE DESIGN REQUIREMENTS FOR THE NEW ELEMENTARY SCHOOL ARE BASED

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PART I. A GENERAL BACKGROUND FOR SCHOOL PLANNING

The planning of new elementary schools for Boston coincides with an awakening national awareness of the prime importance of public education especially in urban communities. It is important to note that the Report of the National Advisory Commission on Civil Disorders, (March, 1968), stresses ignorance - along with discrimination, slum conditions, poverty, disease, and unemployment - as one of the conditions that breeds despair and violence in this nation. Schools in America are presently in a state of unprecedented ferment and change, and present-day educators are faced not only with some of the greatest challenges but also with some of the greatest opportunities that have ever existed in organized society. The public is increasingly conscious of the school's role in the development not only of individuals but of nations. Educators are rapidly acquiring the insights, the resources, and the skills that are necessary to the development of appropriate and efficient school programs. That a serious -- sometimes scandalous -- gap exists between what goes on in the schools, and what could be going on in schools (given present knowledge and resources) remains a disturbing fact; but for educators and parents alike, today is an exciting and stimulating time to be alive.

As we look to the future and consider the sorts of schools that will be needed in Boston, we are required first to examine some of the basic assumptions that underlie all school programs in America today.

If any one phrase summarizes the stated goal of modern education, its central thought would be "individualization of instruction"; the fulfillment of each unique child's inborn potential for

intellectual, social, physical, and civic accomplishment.

To be sure, teachers have given at least lip service to the goal of individualized instruction for hundreds of years, but recently American education has greatly intensified its efforts to achieve that goal. As never before, modern educational practices recognize the vast diversity that is found among individuals. It seeks to respond to that diversity rather than to diminish and reject it; and it aims to render each individual capable of taking responsibility for his own education not only in later life but during the process of schooling.

Gordon Lee, in a recent yearbook* points out that there are three ways in which educational goals are in transition:

a. There is a shift toward meeting broad national needs and the facilitation of national policies (e.g. equality of opportunity for minority groups), as opposed to primarily local needs and policies.

b. The broad, underlying commitment (in previous decades) to the psychosocial development of boys and girls appears to be giving way to a more concentrated focus upon the cultivation of intellectual power.

c. There is a growing rejection of the idea of education as having a fixed beginning or end point.

Out of such trends, Lee and others would draw the conclusion that schools must increasingly concern themselves with children in the roles of students (i.e. learners, each with perhaps a different style of learning and each requiring somewhat different opportunities and treatment). Consequently, teachers must revise their own roles in order to insure that the intellectual climate and

---

* National Society for the Study of Education, The Changing American School. 65th Yearbook, Part II, 1966.

the resources of the school will be appropriate and adequate.

Belated recognition must, as well, be given to the implications for education of rapid developments in the world of science and their import not only upon society in general but upon each individual. Science must be viewed as having become a major component of human experience, and this fact must be translated into the school life of the child. The historical over-emphasis upon verbal learnings and experiences has faulted many children, especially boys, and ways must be found to seize and examine the rich technological world in all its quantitative and imaginative aspects. It is obvious that the building itself can and must nurture this goal, just as the educational program must be so conceived that scientifically illiterate children will not emerge from it.

It must be realized that the rich, creative experiences formerly associated with verbal learning are equally possible in the quantitative area, and that significant rewards and satisfactions for non-verbal children can and should be available within the scope of a balanced program.

A national trend toward teacher specialization derives from a growing appreciation of the impossibility of any one teacher possessing all the knowledge, skills, viewpoints, experience and personal resources, upon which children must draw. As the several academic disciplines expand both in size and importance, it becomes more necessary to staff the schools with specialists representing them. Furthermore, since such persons are more

likely to approach their disciplines as scholars themselves searching for new theories and data, their posture will be less didactic and more tutorial, less that of a source of data and dispenser of information and more that of an investigator with tools and skills to be shared. Inherent in Lee's commentary is that schooling is a continuous experience throughout one's lifetime, not only for the citizens but also for the teachers.

This immediately requires that school planning must include provision for pre-school services, on the one hand, and adult education and community use of schools on the other. Suffice for the moment to say that everything possible should be done in Boston to promote these two types of schooling and to coordinate them with the elementary-middle-secondary school offerings. Too, every effort must be made to insure that the public schools respond to, and take advantage of, the ideas and resources represented in the city and particularly in the neighborhoods or regions served by the individual schools.

BASIC GOALS OF EDUCATION

Already broached is the argument that concern for intellectual excellence and for the assumption of responsibility by individuals for their own learning should dominate the educational scene in Boston. In order that these may be seen in proper perspective, let us pause for a moment to review the several categories of education goals toward which teachers must work. Glen Heathers and others have discussed school objectives under three major categories:

1. Content goals (the "substance" of education)
    a. Conventional emphasis on terminology, classification and information.
    b. Growing importance of explanatory theory and technological applications of information and theory.

2. Personal - Social Goals
    a. Values.
    b. Personality make-up (a positive, optimistic self-concept; self assertion in appropriate ways; emotional security).
3. Process goals (the competencies, interests, and habits needed by learners in acquiring, evaluating, and using knowledge).
    a. Tool skills (as conventionally defined).
    b. Increased emphasis on critical thinking, creative thinking, inquiry (as the metaphor for learning), self-instruction, self-evaluation, pursuit of interests, and effective study habits.

The educational objectives of the Boston School Department are entirely consistent with Heather's categories and their main emphasis is "on the processes which enable the child to learn how to acquire, to interpret, to evaluate, and to apply knowledge".

It is herewith stated as a basic value, and offered as an underlying assumption with respect to all dimensions of the educational program, that Boston's schools can and must allocate appropriate energy to definition and attainment of all three categories of objectives. In particular, it is the stated intent of the School Department to emphasize the third category of educational objectives (the process goals) in the years that lie immediately ahead. The leadership that Boston has historically given in the establishing of goals and objectives thus moves into an important new phase.

Within the content goals, more emphasis must be placed upon the formulation of theories than upon the acquisition of information. As for the personal-social goals, every effort should be made to equip children as self-respecting, self-determining learners. Furthermore, in all aspects of the school program children should be trained and enabled to accept and apply a criterion of mastery for everything they do. This in turn assumes that teachers will provide both the resources and the amounts of time necessary for each child actually to reach a stage of mastery.

Concern for the intellectual fulfillment of the individual in no way reduces or alters the school's role as an agency for nourishing, fulfilling, and improving the society it serves. On the contrary, it has the effect of strengthening that role. As John Gardner has said, individuals with inner resources and a capacity for self-education "will keep the society itself flexible, adaptive, and innovative."

Boston's Schools: Units and Sub-Units

One of the fundamental notions underlying American education today is that the schools must be responsive to the characteristics and needs of children at each stage of their development. Recently many educators, pointing to various practical and theoretical arguments, have been advocating a pattern whereby the sub-units of the school system are identified as:

a. The elementary school, extending through what has conventionally been called grade four or grade five, and including pre-primary classes for children up to five or six years of age.

b. A relatively new unit known as "The Middle School", including the so-called grades five or six through grade eight.

c. The four-year secondary school.

The argument for the middle school need not be examined in detail in this document, since it is concerned specifically with the elementary-school unit ("a" above). Suffice, here, to state that the Boston Schools have decided to base future plans on the a-b-c pattern outlined above, specifically, the so-called KK5-3-4 pattern, with two years of kindergarten available prior to "first grade", and an entry age of four years for the first of these kindergarten years.

A major assumption is that the three types of school units which will exist in Boston can and should make every effort to function as a well articulated, smoothly coordinated system, with flexible policies in each school so that each child's progress from one school to the next will be unmarred by the inflexible, rigid, and educationally dangerous policies and practices that have so long prevailed at the juncture between schools.

For example, in the elementary school envisioned, it will be possible for the brighter and more academically oriented pupil to push well beyond the conventional upper limits of the highest grade level (Fifth Grade, in most instances) in that school, even though he is not socially and physically ready for the environment of the next grade or school unit. By the time his teachers decide he is ready in all respects to be moved up to the middle school, such a child may already have learned a great deal of the curriculum of that

school. Similarly, it is inevitable that the slow-learning and below-average child will reach a state of social and physical maturity equivalent to that of the typical middle school pupil before he has mastered all of the academic work of the elementary school. In both cases, it behooves the middle school to arrange its program so that children at both extremes will feel both comfortable and welcome. Obviously, it also obliges the elementary school to make every possible effort at communication and cooperation with the middle school.

While this may seem obvious, the sad fact is that the typical junior high school in this country, even today, is all too often an uncomfortable and unfriendly place. This is especially true in communities where a significant proportion of the school children are "disadvanteged" in one way or another. Youngsters often find that there is either too little or too much challenge in the junior-high program and the teachers may sometimes seem more concerned about their own convenience in dispensing a standard curriculum package than in meeting the true needs of their students.

What has been said about the transition between elementary and middle schools is equally applicable to the bridge between middle schools and high school. In summary, then, it is intended that Boston's schools will eventually consist of adjoining, overlapping school units in which there is no standard timetable for all pupils, in which children of the same age will by no means be engaged in exactly the same lessons, and where there is maximum concern among the teachers for each child's uninterrupted, continuous progress. Especially if the several units are located near to each other, it is even possible that some children might spend a part of their day in one level (say, the middle school) and another part of the day at another (the elementary unit, or the high school).

Of equal importance is the opportunity such an arrangement would afford teachers to associate across school lines in the interests of their pupils as well as in and across subject or interest fields for their own professional growth.

On a long-range basis clusters or groups of schools serving the same geographic region and functioning in effect as a relatively autonomous sub-system are envisioned. It seems possible, for example, that several elementary schools, feeding into a middle school, could serve as a cluster whose principals and teachers might function as a unit. A senior high school, receiving pupils from two or more middle schools, could complete the complex and the schools in combination could enjoy all the privileges and responsibilities of a separate school system insofar as administrative coordination, curriculum coordination, and the pursuit of educational research and development are concerned. This is merely an illustration, however, of what may become possible if the implementation of school-to-school collaboration and articulation gains widespread acceptance and effectiveness.

Vertical articulation - following the child from kindergarten through to his graduation from high school - is another considerable gain from this cluster of multi-level schools.

In this document, the concept of potential interschool cooperation is recognized to the extent that the new elementary school will be equipped with significant resources which can be shared on occasion with pupils from (existing) smaller elementary schools in the area.

It is, of course, equally necessary and desirable to plan for this school's use of community facilities and in turn, for appropriate activities of the community to locate in the school building.

Boston's Schools: School and Site Size

Although educational literature contains some strong opinions about the optimum size of schools and the proper amount of land to be provided, there is in fact very little hard evidence as to what is essential. Expert opinion is virtually unanimous with respect to what is desirable under most circumstances, and standards such as those promulgated by The Council of Education Facility Planners, (formerly the National Council for Schoolhouse Construction) are a valid and reasonable reflection of best available thinking. Yet it remains that when planners go into a teeming city neighborhood, with hundreds or thousands of families and an agglomeration of industrial, mercantile, and service facilities, it is seldom an easy matter to carve out a suitable site of the size recommended by CEFP without in some way injuring the life of the neighborhood or incurring a staggering cost in the land-taking. Therefore, it is sometimes necessary to make a smaller site do two or three times the "work" of equivalent spaces in suburban or rural areas.

Four things would seem to be important in the planning of elementary schools:

a. Each school must be large enough so that it includes all of the desirable physical resources (e.g., excellent and well-stocked library, rooms for specialized instruction, and adequate play space).

b. All children must have regular access to these physical resources.

c. Each child should feel comfortable in, and not overwhelmed by, the school as a building.

d. Each child should know, and be known by a significant portion of the faculty, including the administrative officer (e. g., principal, or team leader) who has the power to make decisions about him.

Most authorities seem agreed that a conventionally-organized school of 500 - 600 pupils is capable of satisfying these requirements. With the advent of team organization, which makes it possible to create "sub-schools" within the larger unit, it is now also possible to satisfy them in a school much larger than 600. "House" plans and equivalent architectural devices for separating sub-units from each other (psychologically and physically) make it all the easier for a large school to enjoy the advantages described in "c" and "d" above.

With reference to site size, the CEFP (formerly the NCSC) and other agencies have long advocated that elementary schools should be provided with at least a 10-acre site, with an additional acre for every one hundred pupils. Furthermore, it is recommended that when school areas are to serve other community purposes as well, additional acreage should be provided. Obviously, the topography and the condition of the site enter into the question of size, since sometimes a site cannot easily be used for play fields because of slope, drainage, obstacles, or even safety factors. To take a great many acres of land in the neighborhood to be served by an urban school is literally impossible, however, and so it has become necessary to study what can be done on a smaller site by recourse to multi-level structures, roof-level play areas, underground parking, and other relatively unconventional approaches to school planning.

Organization for Instruction

Individualization of instruction is achieved not only when a student works alone or when he is being tutored or counseled by a teacher. It takes place in various settings, within which:

a. The goals that have been established are specifically relevant to him.

b. The instruction materials and resources he is using are specifically appropriate for him.

c. The amount of time available for the completion of the task (or the nature of the task itself) has been adjusted to fit his own needs and talents.

d. The student has a role in determining the nature of the tasks in which he is to be involved.

e. The teaching methods and techniques in use are specifically suited to him.

The actual context within which the child is working can be essentially private as in independent study or in a tutorial situation; it can involve a great deal of personal interaction with other pupils as in the case of project and committee work, or in group discussion; or, it can involve the more limited interaction that takes place when children are hearing a lecture or watching a demonstration.

So much has been said about homogeneous vs. heterogeneous grouping over recent years that many educators have lost track of the need in each child's life for both kinds of interaction with peers. In the recommendations that follow, there is an important assumption that within all programs teachers will see to it that children with similar needs and interests are brought together, particularly in sequential-developmental learning situations;

and also, that children of widely-differing talents and backgrounds will have opportunities for sharing with and learning from one another. The assumptions underlying such arrangements have to do not only with the need for wholesome and complete social development of children, but also with the intellectual growth that is possible on both sides of the relationship when youngsters of varying capacities and different backgrounds have an opportunity to exchange ideas, questions, feelings, and skills.

SUMMARY

In organizing groups of pupils for instruction, the teachers at all three school levels are urged to make appropriate use of:

a. Large Group Instruction (15-300).
b. Seminar Groups for discussion (8-15).
c. Laboratory Groups and Working Groups (5-8).
d. Tutorial Instruction.
e. Independent study (to which, it is recommended, at least 20% of the elementary program and 30 to 50% of the secondary program be allocated).

There is no reason why regular, fixed schedules need to be followed faithfully in any of the schools, or why it is necessary for all pupils to spend the same number of minutes each week in class instruction in the various contents, or indeed why every subject should be taught every day. Granted that guidelines are needed to ensure that each subject receives its fair share of attention through the year, it seems clear that many American schools, especially at the secondary level, have long been crippled by slavish adherence to requirements of time allocation and class schedules. All too often the program has been dictated not by the actual needs and interests of pupils but by the way the school clock has been divided.

Patterns of Cooperative Teaching

Of the organizational changes that have been introduced in American schools over the past decade or two, probably the most inevitable and certainly one of the most important was the emergence of alternatives to the self-contained classroom. Since 1955-57 a great many types of cooperative teaching have been introduced at both the elementary and secondary school levels. In its present imperfect state of development it is by no means clear how the idea of team teaching will eventually take shape. Most likely, a variety of patterns will become well established, each with characteristics best suited to one situation or another. This report makes the assumption that the historic (and now obsolescent) arrangement known as the self-contained elementary classroom will eventually be replaced by various cooperative teaching patterns, and that the autonomous, essentially self-contained teacher in the secondary school will also find himself increasingly involved in a team-like staff structure. Evidence mounts that these are desirable trends, primarily because the team arrangement provides more flexibility in groups and in use of resources, and

it creates a setting within which the continuous professional growth of staff members is stimulated through the exchange of information and criticism. Thus team teaching provides learning experiences for teachers as well as for pupils.

There are three elements of cooperative teaching, all of which must be emphasized if the aforementioned benefits are to be assured.

a. Groups of teachers, sharing the same aggregate of pupils, plan the curriculum together. At least occasionally each teacher's specific daily plans are examined (and hopefully modified) in advance in group session. Each member thus is reasonably conversant with professional goals and repertoires of his colleagues.

b. At least some of the teaching within the team is done cooperatively, so that (among other things) the teachers literally observe and assist each other.

c. Teachers jointly evaluate both the over-all results of the program, and their individual teaching experiences.

It is possible for teachers to organize themselves into very informal teams, or to set up a somewhat structured team with rotating leadership, or to establish a highly structured team with hierarchical leadership. In all cases, it is important that the specialist teachers (e.g. of art, music, physical education) in the elementary school be included as part-time members, and also that non-professional teacher aides and assistants be incorporated in the teams.

At the elementary school level, it seems preferable for the teams to be composed of teachers, each sufficiently a specialist or responsible advocate of one content area(e.g. science, or social studies) to provide leadership in that area within the team; but, all being capable of teaching all subjects. In the middle school, where an interdisciplinary approach would still prevail for the most part, it would be all the more important for each team member to possess a bona fide specialization in a content area. In the senior high school, where the teams would undoubtedly be intra-disciplinary (e.g., a team of mathematics teachers),

it would be desirable to arrange for interdisciplinary collaboration as well, in order to diminish some of the acknowledged disadvantages of departmentalization.

Need for Teacher Training for Boston's New Schools

One problem in the development of team teaching is that the existing corps of teachers and the professors in the teacher-training colleges have had little if any specific preparation for teaming. Probably this situation will improve within a decade, but meanwhile it is urgently necessary for the Boston School Department to operate special training programs in which, first, their leadership people and later all regular and new staff members can obtain first-hand experience in a team organized setting. A training model based upon the 1965 Harvard-Boston Summer Program* has already been developed and tested, and it is a potential basis for the training and re-orientation of existing leadership personnel, principals, key teachers, and central office supervisors, as well as future employees. Other Pilot programs, along different lines to permit the empirical derivation of optimum models, can of course be established and supported in existing schools so that a reservoir of information will be available by the time the new schools are ready for occupancy.

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*The essential elements of H-B-S-P included a "planning-teaching-observation" cycle in which trainees, working in teams, engaged alternatively in curriculum planning (with emphasis upon teaching for the process goals), in collaborative teaching (under the direction of experienced team leaders), and in observing, analyzing and evaluating the teaching and the team-work of other trainees.

Once the city's pending school projects have reached the architectural stage, it is important for the Boston School Department, through its Planning and Research Center, to launch a series of activities involving the selection, training, orientation, and induction of the teachers and other professionals who will work in the new school buildings. Documents should be prepared in which:

a. essential information about the new schools and the rationale behind them will be made available to the teaching staff,

b. suggestions will be made for pre-opening preparation of the professional (and non-professional) staff,

c. suggestions will be made for working with the citizens and agencies of the communities to be served,

d. suggestions will be offered for the long-range in-service program which will be needed in these (and other) schools.

Pupil Progress Policies and Arrangements

Certainly none of the attributes of 19th century education that have been carried forward into the 20th century deserve a more prompt and enthusiastic burial than the rigid structure known as the graded school. Although the graded school once served a useful purpose, it is far and away the most anachronistic mechanism in the education world today. Most, if not all, of the school reform movements since the 1880's have been wholly or largely concerned with a repudiation of grade-level-expectancy standards, of the reward-punishment system associated with promotion and non-promotion and conventional reporting procedures and with the severe inhibitions, both tacit and real, that graded structure imposes upon the curriculum for other-than-average children.

Above it has been stated that the elementary, middle, and secondary chools should overlap each other. To this now are added the specific ssumptions that:

a. The conventional barriers between the various grade levels including those between kindergarten and first grade will be completely ignored.

b. The vocubulary of gradedness - terms such as "first grade", "fourth grade", "promoted", "failed" -- will be eliminated in favor of a new vocabulary geared to each child's apparent progress in reference to potential.

c. More adequate and elaborate systems of reporting pupil progress will be developed in the schools to ensure that each child's achievements will be measured primarily against his own schedule potential, and on an irregular schedule which eliminates all the artificial preoccupation within the school at "report card time".

d. The staff will take considerable pains over the next decade to develop curriculum guides which are relatively independent of the school calendar year, and which, in turn, are geared to more comprehensive and process-oriented procedures for testing and evaluation.

Pre-service and In-service Education of Teachers

It has already been pointed out that a particular virtue of cooperative teaching patterns is that they provide a built-in professional seminar for participants. This advantage, coupled with the curriculum-building benefits that derive from placing specialists in a working relationship to each other, argues strongly for a re-examination of certain impractical and inefficient arrangements that have customarily been defined as in-service education for teachers. It also suggests that it may be well to reconsider the roles of principals, general supervisors, and other specialists whose efforts at in-service work with teachers have long been thwarted, in some measure, by the walls between self-contained classrooms. In the new, team-organized patterns, it should prove easier both to communicate with individual teachers and to carry on the studies and activities which have as their essential purpose the furbishment of professional skills.

Inasmuch as the new schools now being planned for Boston are seen as possible sites for various prototype studies, it seems reasonable to assume - and to endorse - a full-scale utilization of these schools for purposes of pre-service teacher education including student-teaching and observation, and for the development of models. For example, curriculum specialists in the School Department and in nearby colleges and universities might use these schools as clinical laboratories within which their most promising and exciting ideas could be developed and evaluated. This would mean not only that excellent curriculum ideas and

materials would become available within the schools for the local staff to use and enjoy, but also that the directors, professors, and their assistants (e.g. doctoral trainees and others) would be frequent visitors to the schools with all of the direct and indirect benefits that might accrue to the teachers from association with them. Especially benefitted would be the principals and supervisors, who in their roles as liaison agents and collaborators would be constantly engaged in the functions of training and research. It is therefore strongly suggested that all of the new schools adopt a posture of welcoming invasion by these groups, of accepting responsibilities for partnership in research and development and in-teacher education, and of viewing the "R and D" people as professional partners in the most complete sense that is legally and practically possible.

It can be seen that the foregoing recommendations have certain implications for the architectural planning of schools. Ideally, there would be provision in one or more of the new schools of office space for "R. and D" personnel, seminar rooms, one-way observation booths, closed-circuit TV hook-ups, and similar features. Perhaps the architects can find economical ways of providing such features, or insuring that they can be added or installed without difficulty at some future date.

Whether or not this is done, however, it seems absolutely necessary that these new buildings will serve as centers for staff training not only during the academic year but particularly

during the summer months. With the Harvard-Boston Summer Program as one prototype, and in keeping with a growing national and local interest in summer enrichment and remedial programs, it is imperative that the buildings be equipped with air-conditioning.

Materials and Services Needed for Instruction

Living as we do in a time of almost incredible technological advancement, we should not be surprised that such things as the transistor, the television tube, the recording tape, the film, and the computer have revolutionized our concept of instructional materials in the past few decades. It may of course be true, as one educator recently put it, that the most revolutionary educational development in the 20th century will be the intelligent use of books, but it is not necessary to imply a lessening role for the printed page to express astonishment and excitement at what the electronic world seems ready to offer. Consider, for example, the implications for classroom instruction and even for school architecture if we assume the development of economical, efficient two-way video communication to the point where a child might actually carry his classroom in his coat pocket the way he now carries his miniaturized radio!

But a Dick Tracy world is not yet with us, and meanwhile it should suffice to assume that these will be media-oriented schools, in which pupils and teachers will have frequent recourse to electrically-operated equipment such as tape recorders and projectors. Too, books and other learning materials will probably be carried about the building with unaccustomed frequency and in

general there will be a greater need for shelf and storage space than has usually been provided in elementary schools.

That the field of school furnishings and equipment is also going through a period of rapid expansion and development portends the emergence of flexible and functional solutions to the perennial problems of pupil seating, storage of equipment, and the like. Patterns of multi-age pupil grouping, such as are being recommended for Boston's elementary schools, call for furniture capable of comfortably seating children of different sizes and age levels. Shared use of space, and alternating needs for privacy and group participation, creates some difficult problems for architects and the furnishings industry. It is assumed that the administrative officers will keep a close eye on developments in this field, and stand ready to abandon familiar policies of purchasing and distribution as new and better equipment becomes available.

PART TWO: THE PROGRAM IN THE ELEMENTARY SCHOOLS

Introduction

In the preceding discussion a number of major ideas pertaining to the planning of elementary schools have already been mentioned or implied. One of these is the basic policy calling for the development of middle schools in Boston to embrace the educational program formerly found in so-called grade 6 through so-called grade 8. This means that the term "elementary school" as used here refer to programs for children up to and inclusive of ages ten to eleven. Also put forth were strongly recommendations regarding the replacement of graded school structure and policies with a more hygienic and flexible arrangement for vertical progression of pupils; and the abandonment of self-contained classrooms in favor of cooperative teaching.

These organizational patterns have been so extensively discussed in recent years, and their essential characteristics have been so warmly endorsed in the literature, that it seems scarcely appropriate to discuss them any further. Suffice here to say that neither of the two arrangements (nongrading and team teaching) has within itself any magic or any short cuts to educational excellence but in combination they offer an extremely flexible and appropriate framework within which programmatic excellence may be more certainly achieved. However, as noted previously it is not the organizational pattern that leads to excellence, it is the combination of: a vital and viable curriculum, appropriate and skillful teaching procedures, and a psychologically valid atmosphere surrounding

the child, that causes good learning to take place. An important part of that atmosphere is of course the physical environment itself.

For the most part, American schools have done far less than necessary to develop curricula, pedagogical techniques, and atmospheric conditions of the sort that many different kinds of children require. The persistence of graded schools, which place the burden and guilt upon the children rather than the schools, and of self-contained classrooms which insulate teachers from knowledge about the whole gamut of educational problems and solutions, has tended to postpone the profession's discovery of this fact. Hence the educational reform movement of the 1960's has been about a quarter-century delayed. Little wonder that so much dependence was at first place on structural reorganization as such, and so little energy was shifted to the sleeves-rolled-up tasks of pedagogical and curriculum development.

For Boston, then, as for all American schools, the challenge is not to invent new patterns of school organization. The groundwork here is already done, and the changeover is in fact rather simple. Simple, that is, if teachers do not still believe in their hearts that conventional report cards and the threat of nonpromotion are useful weapons to use on slow learning children; that faster learning children should be kept forever busy at enrichment activities instead of going ahead to materials at the next grade level; that every child who underachieves is simply guilty of not trying; and that it is important for all the children to finish the prescribed course by June. Where such teachers exist, probably no changeover will seem very simple.

However, the winds of change blow very strong today, and it is

heartening to see how widespread indeed is the reform movement including the curriculum improvements upon which all else depends. It is therefore anticipated that Boston, in committing itself to the creation of flexible and beautiful new schools, will find that the way to a truly individualized school program is less rough than it once might have been.

Program Emphases

An impressive momentum has been built up over the past five or six years in the direction of significant programmatic improvements within the Boston School system. Work within its various divisions and departments confirms that Boston has set sights on goals such as those described above. Most notably in the context of national and local concern over the educational welfare of disadvantaged minority groups, there are the beginnings of a massive effort to re-design programs and teaching procedures, in line with current research and thinking about the special needs of city children.

The "Community School" concept, features of which are described below, has been identified as a basic, underlying feature of the proposed new buildings, and reflects the long standing real desire of the School Department not only to achieve a closer working relationship with the families of school children, but to collaborate with the various agencies (public and non-public), organizations, and individuals within Boston and each local school neighborhood whose role is also to serve the children and their families.

A major dimension of the emerging school program is a sense of urgency concerning developmental as well as compensatory programs for children in the pre-primary years, i.e., the two or three year period before their entry into so-called "1st grade" at the age of approximately six.

An overwhelming array of research evidence, some of it growing out of

(or associated with) the "Head Start" programs for disadvantaged children, supports the general argument that pre-primary children are in an unusually formative and important period of their lives. Although programs equal to the opportunity presented by children aged three through five are still all too rare, it is increasingly obvious that:

a. A school system which does not include at least kindergarten is an incomplete and sorely disadvantaged school system.

b. Pre-kindergarten programs (sometimes called by the unfortunate term nursery schools) associated at least informally with the public school kindergarten-primary unit can make a great contribution both to the school system and to the individuals they serve.

c. The expense of operating such programs may well be at least partially if not completely offset in the long run by preventing or ameliorating some of the problems that later cost the schools and the society at large such expensive treatment and anguish.

The latter argument, which boils down in part to the familiar phrase "an ounce of prevention is worth a pound of cure" was strongly supported in a speech by Gardner Cowles at a meeting of the National School Boards Association in Boston. It is clearly reinforced by the recent writings of Benjamin Bloom, among many others. Many federally-supported programs serve as testimony to the lively interest which is (at long last) being shown in the pre-primary child. There is, in fact, a national trend toward recognizing that the proper educational preparation of young children is an indispensible ingredient of national manpower policy. In line with this evidence, the Boston School Department has, as has been stated, reorganized its kindergarten program to provide two years of such education, with an entry age of four years.

Later the specific architectural implications of the pre-primary program will be outlined. In general, some of its essential features are noted to be more closely dependent upon programmatic and pedagogical qualities than upon the physical environment. It is clear that much of the program should concentrate upon the enrichment of the child's operating vocabulary, of his overall command of oral language and communication skills, of his perceptual skills (e.g., visual and auditory discrimination) and of the concepts that underlie not only the world of language but the physical world within which he lives. It is equally clear that multiple opportunities should be provided for exploration, for learning how to live and play with peers, for acquiring a repertoire of skills and attitudes that predispose the child to success in the more formal school experiences that are to follow, and for acquiring an optimistic and realistic concept of self (as a person, and as a learner). Each child's needs will differ from all the others in some ways, and therefore the program should allow for individuals to develop in those ways and at those speeds most suitable for them. In short, the non-graded elementary school begins with the pre-school child!

Improving the Curriculum

In this field three general areas of emphasis have been felt to be of essential importance:

1. That there should be established in teacher's minds, and operative in the instructional decisions that they make, a proper balance between the three major types of educational goals (process goals, content goals, and personal-social goals), as mentioned earlier in this report.

2. That there should be appropriate emphasis upon the fundamental skills of language usage, computation, and the acquisition of a solid foundation of facts and essential information in the various disciplines.

3. That in the allocation of resources and time, in official pronouncements concerning the school's philosophy and objectives, and in the professional conversation that is generated within the staff, there should be special emphasis upon certain areas and topics frequently neglected or underdeveloped in public school programs:

    a. The creative and expressive arts.

    b. Health, physical education, safety and recreation.

    c. Those topics and aspects of science and social studies which serve as the vehicles for concept development, socially significant problem solving, and that dimension of intellectual growth for which the term "critical thinking" has often been employed.

Most of these items are fairly self-evident, but it may be helpful to comment briefly on the creative and expressive arts, and health education. It is discouraging to read the history of the elementary school curriculum and to realize how various national emergencies (such as several world wars, the great depression, the political-scientific cold war) and a limited public vision of good education have combined to throttle or destroy some of the most vital and valuable parts of the total program. That art, music, literature, dramatics, rhythms, and other experiences associated with pleasurable living have been ignored and sometimes even despised as unnecessary frills, has cost the American people a very high price. This is evident not only in the overall dull quality of their adult life but particularly in their limited intellectual development. Despite all the lessons of both western and eastern civilizations, Americans have failed to take note of the aesthetic importance and the intellectual rigor of the creative skills. All too often the American concept even of physical education has been

geared less to the fulfillment and enjoyment of human physical resources than to the catering of essentially vulgar public tastes.

If tomorrow's world is indeed to be a world in which leisure is prized and in which wholesome and stimulating activities are to be pursued, the necessary basic skills and attitudes must first be fashioned in the elementary schools. There is plenty of evidence to the effect that adult hobbies and interests have their origins early in life; that people acquire both the desire and the ability to swim and to enjoy art and to create music much easier when they are young; and that people who have had a rich and well balanced school program are more likely to possess strong skills in the 3 R's than persons whose noses were kept constantly on the 3 R's grindstone. It is urgent, therefore, for Boston to bolster and emphasize its offerings in these areas. The provision of uniquely appropriate facilities for this purpose can go a long way toward making such an emphasis possible.

Art Education: Trends and Needs

What is the nature of the current ferment and excitement in art education?

On one hand, the "traditional" foundation for the art course in the general curriculum is being revitalized. This foundation argues that the art program encourages and develops creativity and self-expression and contributes to the growth of personality, while building muscular skill and the ability to work with others in groups. Appreciation of formal art also is furthered by the art program.

The second aspect of ferment is the new and different dimension now being added to the concept of what role and purpose the art program has in the

school. Art education is emerging as an important component of efforts to intensify the education of man's entire visual capacity. It is not sufficient to educate about art and with art as a means for personal development and enrichment. Vision must be trained and utilized as one of man's most important ways of learning, and as perhaps the most important tool with which man integrates himself psychologically and physiologically with an increasingly complex environment. Vision and visual thinking are central to pedagogy and social adjustment. In these roles they have been consistently undervalued, with the apparent outcome that many "educated" people are unable to use one of their most important resources for learning and education. The art education program can help to change this.

A number of concrete implications for the planning of schools can be drawn from this foundation.

Most importantly, the school itself must be aesthetically significant and purposeful. The aesthetics of the school are not a luxury, nor is their importance solely in the creation of an environment conducive to the educational program. Rather, they actually are a part of that educational program. The aesthetics themselves teach and establish standards of visual excellence, and they should encourage the use of vision to interpret the environment. By implication, conscious guidelines must be worked out by the architect on special points such as precisely what aesthetic relationshop can be constructed between the school and the surrounding community.

A second implication is that facilities must be planned for a strong specialized art program. The elementary schools must contain appropriate spaces for art instruction. Such space must be flexible, adaptable to work with a wide variety of media (including photography), and must be able to

accomodate groups of different numbers and ages. Provision must be made for easy use of audio-visual resources, which will come to play a greater and greater role in art education.

Excellent special facilities must serve to enrich the art program, not to limit or compartmentalize it. Therefore, general space must be designed so that visual and art experiences can be easily accessible everywhere in the building. Art (and vision) can be resources to strengthen all aspects of the program, and they can frequently and effectively contribute to the regular language, social studies, arithmetic, and science curriculum.

The following additional suggestions are relevant:

1. Throughout school buildings, exhibition space should be provided for works of value. This should be suitable for works of different forms perhaps loaned by museums or other institutions. Students and teachers should be surrounded by a rich and changing variety of art forms.

2. Display areas for student work should be given careful consideration. Such display should serve the aims of the overall program in art; it is most important that each child be involved in a dignified way with the creative expression of others, including his peers.

3. Planners should consider that specialized art facilities should not be physically detached and separate from general space in the building. The art program seeks not to set art apart from the other disciplines, but to integrate it. Against the undoubted attractions of an "art-music-crafts" cluster or wing should be weighed what this separation communicates to the child about the place of the arts.

Health and Recreation

It is appropriate for schools to be concerned with the physical as well as the social and intellectual development of children. Within the educational programs in health, physical education, safety, and recreation the school attempts to help each child:

a. Learn how to develop and maintain a state of physical efficiency and well-being.

b. Acquire useful knowledge about his own body and develop physical skills which enable him to use his personal resources in wholesome, healthful, pleasurable ways.

c. Enhance his ability to engage in socially useful and pleasant activities with other people.

d. Protect himself from potentially dangerous or debilitating habits and events through an awareness of health and safety.

At least three related functions can be served by a site on which an elementary school is built as a school site, it includes both the building and the adjoining land areas for the school playground, the school garden and/or outdoor education area, parking spaces, and other school-related uses. Certain of the school's facilities (such as the library or an art room or the play fields) have at least the potentiality of serving as neighborhood recreation and adult education centers. The school's grounds, too, might serve many of the functions associated with neighborhood parks.

Cost factors and other practical considerations prevent the immediate provision of a separate all-year swimming pool for each elementary school in the city, but it will be the policy of the School Department to provide pools in some new larger schools, strategically located for cooperative use of other schools in the area, and to broaden and supplement the physical education facilities available in gymnasium and playroom spaces. Instruction in swimming, that nearly perfect form of exercise, is greatly to be desired in elementary schools, and the provision of at least one pool in each neighborhood cluster of schools will make it possible for such instruction to become more widely available to Boston's children. The potential value of such pools as a community recreation resource is also to be noted, incidentally.

An Approach to Nature Sciences

It is expected that the school will develop and use its indoor and outdoor facilities as laboratories for instruction in the sciences associated with farming, gardening, animal husbandry, and nature study. The urban child probably has far greater need than the suburban and rural children for significant experiences with flora and fauna. There is in a city a general shortage of open, green areas where children can encounter trees, bushes, flowers, and other living plans on intimate and significant terms. Animal life in the city, similarly, is very restricted and few children have significant experience living with and learning from animals. In a very real sense, then, the school must attempt more ambitious programs to acquire some of the characteristics of the idyllic countryside.

In a public elementary school in Amsterdam, Netherlands, which serves a congested, disadvantaged neighborhood of the city, classrooms and corridors are

always full of plants and freshly-cut flowers are grown and cared for by pupils; flowers are frequently sent home with children or serve as gifts to shut-ins and other needy persons in the community. Similarly, the school teems with animal life; the children have become so skillful in managing aquaria that the school serves as a wholesale supply source (for exotic fish, and aquarium plants) for most of the pet stores in Amsterdam. In pens and cages built by the children and their parents, rabbits and chicken eggs are raised for the commercial market, as are other animals including colorful game birds. Whenever a baby is born in the community, the children deliver a carton of fresh eggs as a token of friendship. Evenings, week-ends, and during school holidays it is customary for children, sometimes accompanied by members of their family, to enter the school with their own pass keys in order to tend to the numerous plants and animals. This school (Oranje-Nassau School) is justly famed throughout Europe, and admittedly it is an unusual example, but it is hoped that each new elementary school might emulate an Oranje-Nassau in at least some ways and that appropriate consideration be given in space planning and design as well as curriculum development to facilitate such opportunities.

In passing it may be noted that over the years, stimulated by the development of a program of this sort, it would be possible to develop local "day camp" programs during the summer and winter months in which can be achieved many of the values associated with off-campus outdoor-education programs, such as the school camp.

Varieties of Learning Experiences

The elementary school curriculum is in a state of unprecedented ferment, and it is almost literally impossible to predict the directions in which school programs will move as technological advances increase both the efficiency and the range of educational exposures available to children and national and regional curriculum projects produce better and more detailed recommendations concerning educational goals and means for assessing their attainment. The apparently belated discovery that children have many different ways or styles of learning has opened up an exciting new field of practical scholarship, and the literature is virtually bursting at this moment with commentaries on how children think and learn and how teachers can best provide for one or another type of youngster. A strong theme in this literature favors differentiated, individualized instruction and extensive provision for independent study, even though there is a growing appreciation of the need children have to learn with and from each other in a variety of settings and contexts.

That learning must be a more active process is scarcely a new argument, and yet it remains that for many children a school day is divided mostly into periods of sitting and listening. Granted that a firm command of rudimentary facts and skills is essential, and granted also that didactic teaching is by no means an obsolete professional tool, the emphasis in tomorrow's school must be clearly upon searching, questioning, discovering, wondering, and yes, enjoying! The physical atmosphere, and the

provisions that are made for facilitating pupil traffic and controlling noise and other distractions, can do much to facilitate such an emphasis.

Hopefully, each school will develop and evaluate its own unique approach to basic education and to the discovery mode of learning. The library and instructional materials center in each school, though equipped with the usual printed and audio-visual resources, might seek to develop certain unique resources appropriate to the local curriculum emphasis. Thus an atmosphere of genuine experimentation (and all of the attendant excitement which some have described as the Hawthorne effect) will permeate the school. Hopefully all schools will make an effort to de-emphasize conventional textbook approaches to teaching, and to make use of the interesting materials growing out of the various national and regional research and development projects.

There should, of course, be a good balance between class experiences of the sort where children (in large groups) are engaged primarily in listening and watching, group experiences where children are working and interacting with each other, independent study activities, and individual tutoring of pupils by teachers or older pupils. These recommendations, it should be emphasized, are applicable to all age levels including preschool, although obviously the proportion of activities may vary between older and younger groups.

PART III: THE COMMUNITY SCHOOL

Schools are the most important public facilities of the community, and planners seek maximum benefit to the community of the investment it makes in school buildings. Furthermore, there are important educational reasons for bringing the school into a close relationship to the people of the neighborhood it serves. The phrase that is generally used to describe a school which has this sort of community orientation is "the community school."

A community school serves the needs of all the people who live in the community, and expresses the interdependence of the school and community.

The concept of the community school expands the traditional understanding of the relationship between school and the community and of the role each has in relation to the other. The community school has three distinct characteristics:

1. The community school is foremost an educational center for residents of the community.

The primary responsibility of the school is to the children who regularly attend it. But the needs of citizens, particularly the urban dweller, demand educational programs ranging from pre-school classes to adult literacy programs. These programs can be located in a school building, which is convenient for the resident and is open from early in the morning to late at night, seven days a week, throughout the year.

2. The community school discovers, develops and uses the resources of the area it serves.

The foremost community resource is its people, and area residents are involved in the programs of the truly effective community school. Further, community school utilizes resources of public and private institutions and buildings, including libraries, museums, businesses, clinics and factories.

3. The community school provides a setting for participation and involvement of the community in the schools.

The community school program engenders the community's enlightened concern and involvement in every aspect of the school program. Since education is a community enterprise, this furthers the school's objective of quality education for all.

Attention should be given to the needs of the residents of a neighborhood which are common to urban dwellers everywhere. A worker entering the job market today will need re-training an estimated seven times before he retires. The schools, particularly at the elementary level, may not undertake this entire job, but a community school can contribute to a neighborhood appreciation of learning and the upgrading of skills. Old and new residents of this neighborhood of every income level share this need for continuing education to meet demands of the rapidly changing technological society.

Community facilities are bargain facilities. A closed school operates seven hours a day for 180 days each year - 1,260 hours. A community school is open fourteen hours a day for 300 days a year - 4,200 hours, an increase of 340%.

Citizen pride, resulting from community use of the school, can greatly reduce problems of vandalism. In New Haven, involvement of the community in the school has actually reduced the number of broken windows. In Flint, Michigan, community use tends to preserve the condition of auditoriums and gymnasiums as citizens of the local community take care of "their" property. Generously contributing time and money over the past thirty years, Flint residents have visibly demonstrated their commitment to the community school concept through group work projects, building and repairing playground equipment, skating rinks, ball fields, etc.

In terms of educational effectiveness, the community school is an immensely profitable investment. Some argue that schools should be concerned exclusively with books and classrooms. They do not see the clear connection between education (or the lack thereof) and urban problems such as unemployment, family dislocation, and crime. The community school, involving the entire family and neighborhood in the educational process, creates a constructive attitude toward learning and the child. He regards the school as a familiar and respect part of the life of his family and neighbors. The community school, therefore, furthers the most crucial objective of the school, the education of the young.

PART IV: THE CHANGING PHYSICAL REQUIREMENTS OF NEW SCHOOLS

> Not so long ago it was relatively easy to specify the kinds and sizes of space a school needed. Loyalty to the self-contained classroom, confidence in the desirability of class size between twenty and thirty, and an attitude of cheerful compromise toward various supplementary space requirements (library, offices, multipurpose rooms, and so forth) combined to persuade school administrators that what they needed was an "egg crate" of equal-sized compartments plus modest auxiliary facilities. And this, of course, is what the architects gave them.*

The school building is actually a piece of educational equipment. While it is the largest equipment item in any educational situation, nevertheless, it must be specifically designed in every detail in order to carry out its purpose. The fundamental aim is to develop a structure which will facilitate carrying out the school program in successful fashion. This means, of course, that the school program should be well laid out and well understood by those who are planning the building. In a sense, the problem is one of translating the educational program into a physical plant.

However, there are certain cautions which must be observed. Many existing school buildings were specifically designed for school programs which, though perhaps suitable at the time the structures were erected, have undergone change as the years went by. School buildings which are specifically designed for a particular educational program, and which do not have inherent flexibility, may experience early obsolescence as program needs change. One requirement for any new school is therefore that it must be sufficiently flexible in physical structure to permit radical changes at a later date in the assignment and use of space, including the

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* From Chapter 7, "The Changing American Schoolhouse," in Robert H. Anderson, Teaching in a World of Change (Harcourt, Brace and World), 1966.

possibility of drastic modifications in the size of spaces and the location of space dividers and in the functioning of utilities.

Historical and Current Setting

In the history of American schools there have been many kinds of school buildings, ranging from the "Little Red School House" with few children but with large outdoor space, to huge city school buildings having many children but little land area. Traditionally over the years, the American schoolhouse was a forbidding place for children, particularly for children of elementary school age. Basically it consisted of little more than an accumulation of standard classrooms with screwed-down seats, and it fostered an environment in which the pupil's chief virtue was to remain quiet and speak only when called upon.

Buildings illustrating this philosophy continued to be the rule through the first third of the twentieth century. However, the so-called activity program, which came into being during the thirties, made new demands upon space and equipment. Schools designed during the thirties and forties were in many instances a great improvement both aesthetically and functionally over the traditional school, although long-established habits of the profession combined with public loyalty to time-tested architectural patterns tended to delay a real breakthrough. Nevertheless, by 1952 it was possible for several authorities to claim:

> "Since the early thirties, a new kind of elementary school building has been in the making, the characteristics of which are inspired by democratic concepts of human relationships. Following the gains made in improved teaching methods and a more fundamental understanding of child life and growth, the contemporary school has become less of a forbidding institution. Its spaces are adjusted to child scale. Its equipment may serve the needs of the individual, the small group or the larger class section. The environment

> has become that of the child's world in which all the desired educational objectives can be achieved."*

In approximately 1955, spurred by what has since come to be known as a major educational reform movement, school architecture entered into a new and dramatically creative period which has yet to reach its climax. Several dimensions of the reform movement have already been mentioned in previous sections of this document; suffice to say that almost every educational trend of the past decade has had important implications for school design. Perhaps the most notable of these have been the emergence of cooperative teaching patterns, the rapid growth of educational technology (e.g. audio-visual media), and the further development of individualized approaches to instruction.

The increasing importance of school buildings and equipment as a component of educational service is symbolized by the establishment of the Educational Facilities Laboratories, Inc., as a major unit of the Ford Foundation. The excellent publications of this organization, reflecting and disseminating the best that is known about the "things" of education and how they may be designed and constructed, have helped to spread useful new ideas and accelerate their adoption.

In brief, the fifteen-year period since the Engleharts wrote the above-quoted appraisal has seen even greater gains. Various architectural, engineering, and manufacturing advances have revolutionized the (potential) shape and structure of school buildings.

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* Planning Elementary School Buildings. N.L. Englehart, N.L. Englehart, Jr. Stanley Leggett. F.W. Dodge Corp. New York, 1952, Foreword.

> Despite these innovations, however, school architecture in America is still not the flourishing art it deserves to be. Most American schools are still sterile, unattractive, uncomfortable, and inflexible. The very fact that many new school buildings have won journalistic attention is evidence that interesting design, striking beauty, and functional suitability remain newsworthy (that is, rare) attributes whenever they are found in a school. Many people, in fact, are suspicious not only of the probable fiscal extravagance involved but of the educational legitimacy of school facilities that combine grace with versatility.
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> The greatest progress to date has not been in school design but in engineering and equipment. The organic functional features of schools have, understandably, changed more fundamentally and quickly than have the form and shape of the buildings themselves. This is not altogether the fault of the architects, since communities have given architects less freedom than they have given engineers and equipment designers. The full genius of the architectural profession has yet to be released in the design of school buildings.*

Unquestionably, the need for creative school design is even greater when the project in question is to serve young children in the dynamic environment of a large and restless city. That so many of the long-range plans of the School Department are both the genesis and the hoped-for consequency of the present schools, that there is a strong commitment to the community dimension of these schools, and that other cities will be keenly interested in Boston's decisions makes it all the more imperative that the space planners and their educational partners should seize the opportunity for breaking new paths.

The Child and His Environment

In newer schools there has been a serious effort to insure a proper environmental effect upon the youngsters who are enrolled therein. It is

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* Anderson, Op. Cit., 132-133

therefore necessary to consider, in planning, essential factors of the child's school environment which can be manipulated to develop a situation compatible with his physiological needs. One of these factors is size of the physical things which surround him. It is, of course, obvious that his seat and desk should fit his physical dimensions. It is also necessary that chalkboards should be so located in height upon the wall that what is written thereon will be substantially close to his eye level and within convenient reach of his efforts to write. Sinks and counters should, of course, be of heights suitable for his size and while all children of the same age are not of the same size there is a reasonable range for each age group that experience has shown to be suitable. Generally school equipment for elementary schools is available in sizes well adjusted for the different age groups and it is to be expected that proper choices will be made in the various categories.

However, the problem is also a psychological one. When the need arises of locating a large school upon an urban site of relatively small acreage it becomes obvious that more than one story will be involved. How, then, can the architect design a large building so it will appear to be reasonably small in the eye of the child? The question deals with more than the total bulk of the building. There will be doors, passageways, windows, window ledges, storage cabinets, stairways, food serving facilities - in fact, practically all the features of the building - which can either seem quite natural to the child or be awesome to him.

Closely related to the question of the effect of size in the elements of the environment is the simplicity-complexity dimension. This is particularly important in larger schools. Presumably the child's capability

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environment and its effect upon his vision. The need for higher reflection percentages for walls and floors also played a part in this reaction.. The first result was a move to pastel shades of paint for walls and trim, with such theorectical embellishments as the suggestion that cool colors be used in rooms having southern exposures, and warm colors be used on rooms having northern exposures. Along with this came the use of variously-colored chalkboards in place of black slate, with green being the first color to move into the new patterns, but followed eventually by blues and browns and various other shades. Along with this also came various colors for tackboards, particularly with the advent of vinyl wall coverings in a boucle pattern which could be glued to composition boards and used for tackboards. Since these materials were available in an almost unlimited range of colors, variety became the spice of the visual environment. Meanwhile, more daring architects and educators moved away from the pale pastel shades into a limited use of bright and more daring color schemes. Perhaps one of the first uses of bright colors was on classroom doors, as a color code for children. Many schools have become brighter and more colorful places in which the child may spend his school days than were ever envisioned a generation ago!

In effect there is running all through this line of thought, a feeling that the school should serve as a real and pleasant home for the child. In other words, it should not give him a feeling that it is an institution of awesome proportions. Through reference to the ideas expressed above, and

in many other ways, the architect can strive to design a non-institutional environment. Thus, the child who comes from a home with a warm and comfortable atmosphere finds in the school a continuation of such external stimuli. For the less fortunate child the school may possibly be the nearest thing to a comfortable home that he has.

Among recognized ways of achieving the psychological effects which have been called for above, are (1) the use of carpeting, (2) the provision of properly-sized easy chairs in a reading area, and (3) the design of toilet rooms to resemble as far as possible a home bathroom rather than a public toilet. Sometimes some elements of the structures, such a ceiling beams and the choice of window drapes with appropriate motifs, may also strengthen the desired impressions.

Decorations and exhibits which are appealing to children, and a general avoidance of "institutional" features such as long, shiny corridors can also do a great deal to make a school seem like a more friendly and congenial place. By the way, recent research into the self-concept of certain urban children suggests that they literally need a visual image of themselves. It therefore seems very desirable to install mirrors, not only above lavatories, where appearance can be checked, but even in the corridors and in other places. Some of these should be full-length, and if chosen for their decorative value (as people often do in their homes) the mirrors can make a valuable contribution not only to the environment but to the ego-development of the children.

The Organization of Instructional Spaces - The Changing Elementary School Classro

Prior to the advent of the graded school, which had its American beginnings in Boston in 1848, the classroom was usually a loosely-organized place in which pupils of widely-ranging ages and achievements were instructed on an individual basis. Most schools were small, with perhaps 8 or 9 pupils in attendance, and classrooms were usually of small size. Some interesting theories have been offered as to how educators eventually hit upon 25 as a desirable number for class instruction, but it seems likely that this came about principally because of the limited size of available rooms or buildings in the colonial and early national period, and because teachers became accustomed to dealing with the number of children that could be fitted into them.

The grading of schools made possible the structuring of a previously disorganized curriculum, the improved training of teachers, and the publication of useful textbooks that gave a visible unity and continuity to the program, except in rural areas, where only a few pupils were enrolled at each grade level and thus a single teacher carried the entire burden. Classes came more and more to include only children of a given grade level and each teacher therefore tended to work, as before, in relative isolation from other teachers. School design, as a result, tended to institutionalize the idea of autonomous, one-teacher units and larger schools were for all practical purposes merely a collection of one-room schools sharing the same roof and heat supply.

As school programs expanded to include physical education, art, music, library, guidance, and other offerings requiring (or profiting from) special facilities, these were added along with specialist teachers to supplement the "regular" teaching staff. Some elementary schools also adopted patterns of departmentalization, which differed significantly from the usual arrangement in which the same teacher taught all of the major subjects. However, until the 1950's there was widespread agreement among educators favoring the generalist-teacher plan, which by then was termed "the self-contained classroom".

Notably, even the departmentalized alternative did not influence school architecture in any significant way since instruction was still an essentially private affair (with each teacher "owning" his classroom, so to speak) and class sizes still tended to be the same.

However, in the 1950's education entered a period during which the centuries-old definition of teaching was in effect rewritten, and substantially different instructional and grouping patterns gained general acceptance at least in the literature. For the first time in history, a collegial concept of teaching came into prominence, and technologies (both procedural and mechanical) appeared with the capability of making "independent study" and "individualized instruction" a major aspect of the school program.

It would be reckless to claim that these ideas will prevail over time, just as it would be foolish to ignore the historical antecedents of ideas now labelled as "new". However, Boston's interest in the further development of flexible, nongraded classes and of the pupil-grouping and staff-utilization practice associated with the term "team teaching" is clearly in keeping with the trend as scholars now see it.

At the very least, Boston's new schools must have the capability of housing these organization patterns and at best, they should serve to stimulate and foster their full development.

This means that the very term "classroom" no longer has the specific and restricted meaning which derived from the adjectival phrase "self-contained", and insofar as possible we must consider the instructional spaces as malleable, coordinated aggregates.

Pupil Groupings and Sub-Groupings

In the typical urban school, which enrolls a fairly large number of pupils at each age-grade level, there exists a policy to the effect that each (self-contained) class will be either deliberately heterogeneous, or deliberately as homogeneous as circumstances permit. By "homogeneous" is usually meant that the pupils are selected so as to reduce the range of academic ability (quite often, potential performance in reading and arithmetic is the chief criterion) and/or achievement.

Historically, homogeneous grouping has been justified on grounds that it is uncomfortable and inefficient for children to compete with other children who are capable of working at a higher or a lower level. It was also felt that the teacher's time could be used more effectively when he addressed his work to a narrower range of pupils. So-called ability or achievement grouping, however, has often run afoul of parents because it tends to stigmatize the lower groups and create an "elite" among the prestige classes. To the cry of "undemocratic!" is added a mixed verdict from research, which by the way is based almost entirely on self-contained classroom groups, and therefore, somewhat irrelevant to the new situation.

Of great interest is that cooperative teaching, and various arrangements (like the "Joplin Plan")* which preceded it in development, now makes it possible to enjoy the benefits, and they are many, of homogeneous grouping without suffering the aforementioned criticisms. It is possible through these plans to assign children to a heterogeneous team of 75 to 150 or more pupils, and thus to insure that children of differing abilities and backgrounds can have the rich social and intellectual benefits that derive from such interaction. Within the team complex, however, it is also possible to arrange for three children of similar needs and backgrounds to work together whenever desired.

In the glossary, which follows, the term sub-group refers to aggregates of, say, ten to twelve youngsters with a common interest, problem, or task. In a self-contained classroom, a teacher desiring to create a homogeneous sub-group has only twenty-five pupils from which to choose. As a result, the sub-group is likely to be quite heterogeneous afterall.

But suppose we now posit a cluster of 75 pupils, or a team of 150, or even a house of 300 pupils! Now it becomes obvious that we can find a much more homogeneous sub-group of 10 to 12 youngsters when we want it. Since sub-groups are created frequently within the team across classroom lines, it is much less likely that children will be stigmatized by their membership in a particular group.

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* A plan in which several "self-contained teachers interchange pupils for one or two periods a day in order to create more homogeneous reading (or arithmetic) groups.

Whether or not teachers choose to go directly into full-scale team organization, and to set up the clusters and teams on a heterogeneous basis, ought not be pose any serious problems for the space planners. If well conceived and designed, spaces can be provided within which almost any pupil organization plan can be used. It is expected, however, that the plan will have a strong bias in favor not only of the general concept of team organization but also the idea of encouraging interaction among children of two or more age levels.

A Glossary of Terms

There follows a list of terms that can be used in describing space requirements for various pupil aggregations, implied or specifically recommended.

Sub-Group	- refers to a specific instructional group, such as a reading group or some other portion of a class working on a common problem (less than 25 pupils).
Class	- refers to approximately 25 pupils who are regularly or at a given moment identified with a particular classroom and/or teacher.
Cluster	- refers generally to three classes (75 pupils, 3 regular classroom teachers) with a common physical and educational identity. (Upper House only)
Team Center	- in the Upper House, refers to two adjoining clusters with 6 regular teachers, 150 pupils, and 6 classrooms and adjoining shared areas.
	- in the Lower House, refers to two adjoining pairs of classrooms with 4 regular teachers, 100 pupils, and 4 classrooms and adjoining shared areas.
House	- refers to two (or three) team centers on the same floor or region of the school, plus perhaps those special classes or other pupil groups located in the same region and having a degree of administrative, social, and educational identity with the team centers.
Lower House	- is a term which refers to the organizational unit containing children, aged 5 through 7 years, who would, conventionally, be in Kindergarten, "First grade," and "Second grade."
Upper House	- is a term which refers to the organizational unit containing children, aged 8 through 10, who would, conventionally be in the "Third grade," "Fourth grade," or "Fifth grade."
School	- refers to the entire administrative unit.

PART V: DESIGN CAPACITY

The general plan calls for the new school to enroll approximately 743 pupils. Using figures and advice provided by the School Department, it is estimated that this total may be broken down for planning purposes as follows:

First-year Kindergarten I pupils (attending half-day only)	100
Second-year Kindergarten II pupils (attending half-day only)	100
Pupils in elementary (grades 1 through 5)	500
One Special Class	18
One Advanced Class	25
Total	743

Since the pupils in this school will be assigned to classroom clusters, and class groups need not be directly based on age or grade status, and since all furnishings and equipment will be similarly flexible, the plans that follow can be adapted to almost any enrollment distribution that may occur in future years. For convenience and the sake of simplicity, however, we shall in our discussion assume an even distribution of pupils by age.

For a given total enrollment, the number of typical instructional spaces (i.e., "regular classrooms") necessary is usually determined by the desired average class size. For these schools it will be assumed that Kindergarten sections and older classes will have an average of 25 pupils with the actual class enrollment figures probably ranging between 22 and 28.

With these ranges of total enrollment per grade and of class size in mind, it therefore appears appropriate to establish 4 groups of 25 pupils as the basis for the design capacity for each age-grade level, since 100 is

the estimated total (including Kindergarten sections). This arrangement will allow some margin for larger-than-average groups in some years, and for smaller enrollments in other years. This pattern is therefore used in the planning of this school, and accordingly, the necessary basic instructional spaces consist of four classrooms (or their equivalents) for each of the five "grades", plus Kindergarten.

There appears to be a national trend towards the inclusion wherever possible of handicapped children in classes with normal children. It is also likely that adults from the community who occasionally use the building will sometimes be handicapped. It is therefore recommended that, wherever possible, the architects provide ramps up to entrances and even within the building. At least one elevator should be provided between floors, and door widths should permit passage by a wheelchair.

Because of the possibility of increased enrollment in this school in future years, the architect is advised to plan for the possible addition of one classroom for each age level in the school. The capability should exist of adding each of these seven future classrooms to the appropriate cluster for that age level.

PART VI

Translating the Individual Needs of Children Into a School Plant

The Basic Plan for the New School

In the background material that has been provided to this point, several major facts and recommendations (both explicit and implicit) are presented:

1. The new school will embrace pre-primary through the so-called 5th grade.
2. Maximum use must be made of the school grounds, for educational and recreational purposes.
3. Since schools no longer can adequately represent (if they ever could) the outside world, the constant use of field trips, and educational exchanges, should be encouraged.
4. The division of a school (whose excellent total resources can be enjoyed) into several smaller sub-schools (houses and team centers) in which each child can feel more at home and can be protected from a feeling of massiveness is desired.
5. In both Houses of this school, it is suggested that an attempt be made to provide considerable heterogeneous age grouping of children. In the Upper House, especially, this can be achieved by including in each of the Team Centers two classrooms of 8-year-olds, two classrooms of 9-year-olds, and two classrooms of 10-year-olds. In the Lower House, it is recommended that each four-classroom Team Center be comprised of two classrooms of six-year-olds and two classrooms of seven-year-olds.

6. The school building should nurture in particular those educational activities associated with (a) individual, independent work, (b) small-group interaction, (c) fundamental communication skills, (d) creative and expressive arts, (e) science, especially natural science, (f) health and physical development.
7. The building should facilitate professional collaboration and interaction within the staff.
8. The arrangements in the school should give close physical proximity of educational resources to both pupils and teachers.
9. Relationships between things (facilities) and people (staff) must be carefully thought through.
10. The needs of the neighborhood in which this school will be located suggest school facilities with the following community uses:
    a. Regular Classrooms - Some classrooms open for small meetings, adult education, and tutorial programs.
    b. Reading Laboratory - This center should be capable of being used by adults as well as by children.
    c. Kindergarten - At least one of the kindergarten rooms should be designated for potential use by children in a summer head-start-type program.
    d. Gymnasium - There should be a gym large enough for adult use and with adult equipment provided.
    e. Cafeteria/Auditorium - This space should be able to accommodate cultural productions, and be used as a meeting place and banquet area by both adults and children.

f. Playground - The playground should include adequate play equipment for a program both day and night and during the summer.

g. Community Room and Office for Community Director - a strategically located space should be designed for use by a person responsible for community activities, as well as a space for many of the activities.

Summary of Major Recommendations

The classroom plan which follows is merely one possible arrangement. It may be altered by the architect provided the functional relationships shown in Figures I and II are preserved. It will be left to the architect to decide the level on which to locate each instructional group, as well as the other facilities. Indeed, the architect should decide how many levels there should be to the entire school.

1. Pupils to be divided into "Houses" and "Team Centers" as follows:

Lower House

(a) 200 Kindergarten pupils (100 attending each half-day housed in four classrooms (two pairs)

(b) 50 six-year-olds ("first grades") housed in two classrooms, and 50 seven-year-olds ("second grades") housed in two classrooms; the total comprising one Lower House Team Center. (two pairs)

(c) Same as (b); the total comprising a second Lower House Team Center. (two pairs)

(d) 18 "special" students, housed in one classroom, adjoining one pair of classrooms in (b) or (c).

Upper House

(a) 50 eight-year-olds ("third graders") housed in two classrooms, 50 nine-year-olds ("fourth graders") housed in two classrooms, and 50 ten-year-olds ("fifth graders") housed in two classrooms; the total comprising one Upper House Team Center (two clusters of three rooms).

(b) Same as (a); the total comprising a second Upper House Team Center (two clusters of three rooms).

(c) 25 "advanced" students, housed in one classroom, adjoining one cluster of classrooms in (a) or (b).

11. Instructional Features

(a) Each team center to have an open "common learnings area" (formed, in part, from what would otherwise be corridor space.)

(b) Each team center also to share a Projects Area (construction activity, practical arts, etc.) with one other center.

(c) Two Science Centers, (one for the Lower House and one for the Upper House).

(d) Two Reading Laboratories, (one for the Lower House and one for the Upper House).

(e) One junior-high size gymnasium, divisible into two parts, to serve physical education and other purposes (with a locker room for each sex adjacent).

(f) One Cafeteria/Auditorium, with stage.

(g) One Library (Instructional Materials Center).

(h) Two teachers' planning centers (one for the Lower House and one for the Upper House).

(i) One Music Room.

(j) Outdoor play areas.

III. Other Details

(a) One Community Room and one office for Director of Community Activities.

Divisions and Sub-divisions of Space

For reasons given earlier, an effort has been made in the basic plant to create for each child a "small-school" environment." Most of the child's school day will be spent in the team center and in the immediately adjoining region of the house, and these spaces are adequate for almost all instructional purposes except physical education and certain musical or dramatic activities. The lunchroom function is also not provided by these spaces.

Each four to six-classroom Team Center will probably have a total floor space of about 10,000 to 12,000 square feet. Within this space would be incorporated the general areas for instruction with a teacher working with a particular group of pupils, a common learning area, access and exit spaces and routes, storage of supplies, books, and equipment (to some extent in fixed storage spaces, but more commonly in movable storage cabinets), toilet spaces, refrigerated drinking fountains, display areas on the fixed and movable walls, chalkboards, workcounters with sinks having hot and cold water available, bookcases (generally movable), magazine racks, various types of display shelves and cabinets, various types of projecting equipment, including television receivers, such computer and programmed learning equipment as may be applicable to the particular house. In the Lower House and in the Upper House, conveniently adjacent, will be specialized space for the program in science. Each house will also be served by a project area for practical arts and fine arts, and by a reading laboratory.

The total space for the Team Center is roughly equivalent to the classrooms plus access space, storage room, toilet rooms, and other usual accessory spaces for the number of pupils involved. However, it is important that the design of this space is not based upon nor confused with the traditional arrangement of classrooms in a somewhat long and narrow rectangle bordering both sides of a central corridor in what has been aptly called the "egg-crate" design.

Figures I, II, and III, which follow on the next three pages, present schematics which attempt to show how the recommended components of the school should relate to each other. It must be emphasized that these are not floor plans, they are not to scale, they are not based on any consideration other than functional requirements. A code to guide the reader, pending further discussion of the various components in the text which follows, is herewith provided.

Code to Figures

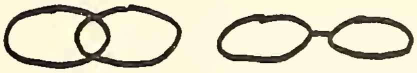
Kg I, Kg II, etc. = Kindergarten Classroom No. 1, No. 2, etc.
LH 1, LH 2, etc. = Lower House Classroom No. 1, No. 2, etc.
UH 1, UH 2, etc. = Upper House Classroom No. 1, No. 2, etc.

= Signifies an intended close relationship between spaces
S = Storage
T = Toilets
W = Provision for coat storage (wardrobe)
Ob = Observation booth
MS = Music Storage (instruments)
MSC = Music Storage (chairs)
MO = Music Office
P = Preparation Area

FIGURE I

LOWER HOUSE

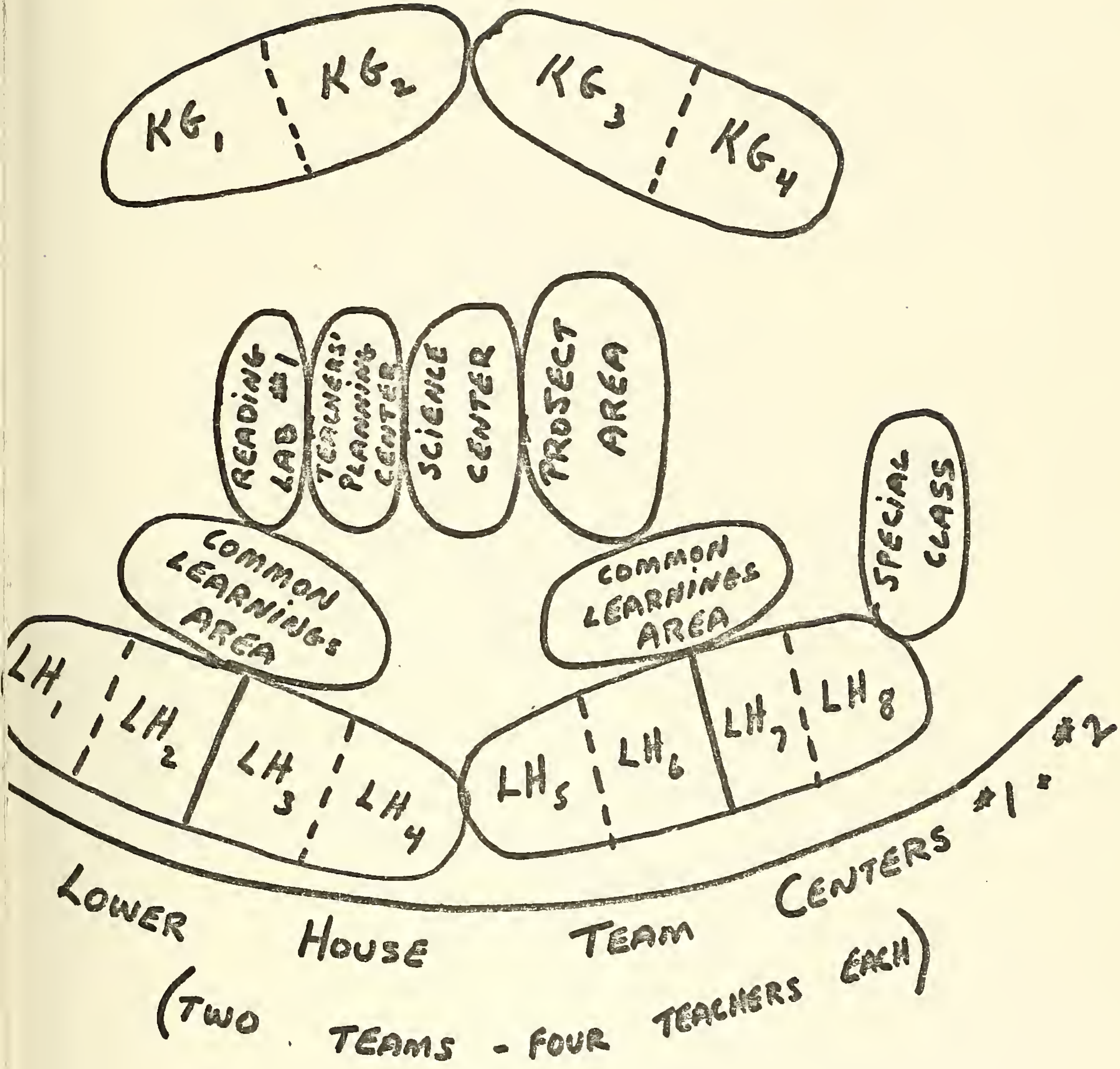


FIGURE 11
UPPER HOUSE

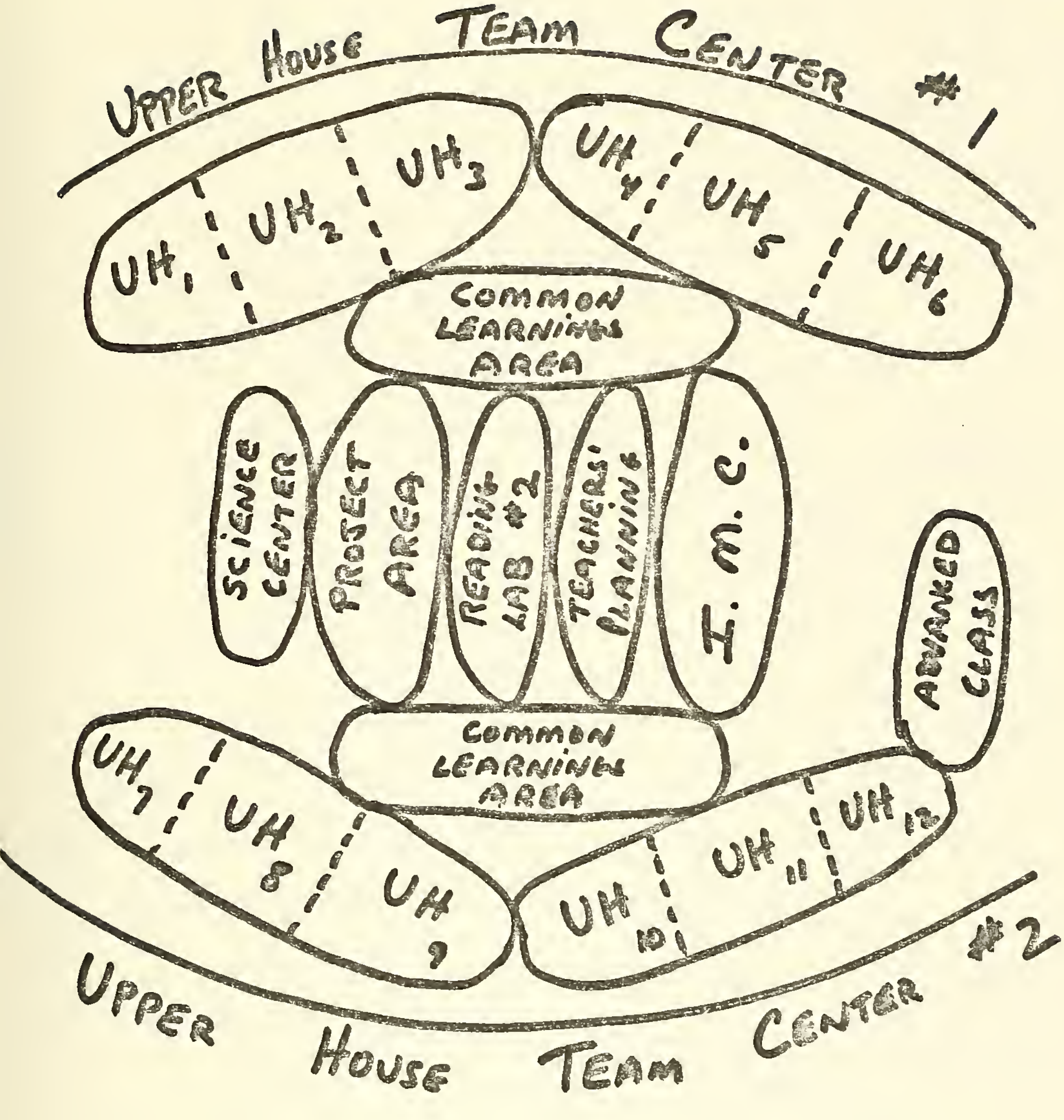
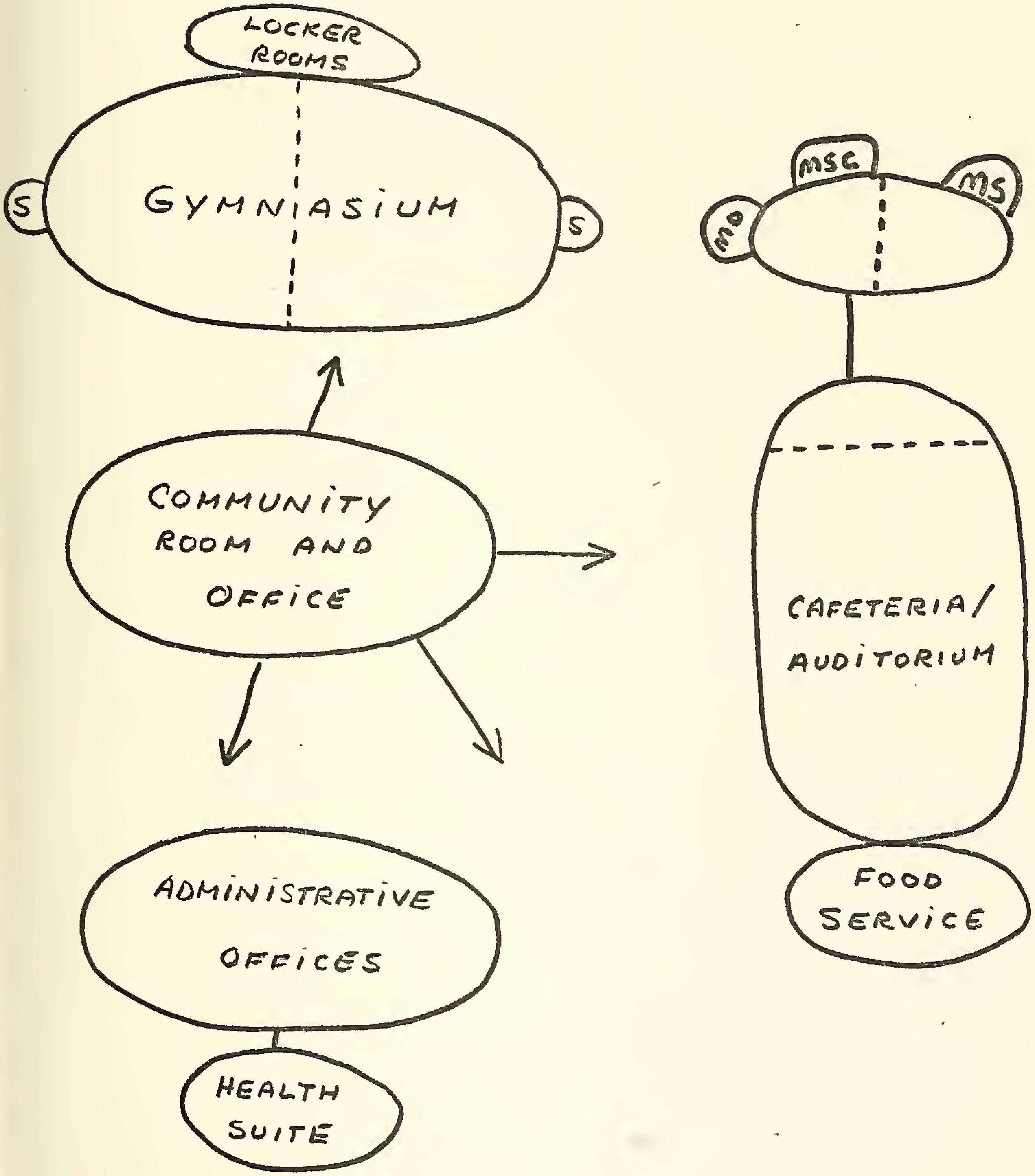


FIGURE III
OTHER FACILITIES



Recommendations concerning the shape and distribution of the spaces comprising each house will be made in a later section. First, however, it seems appropriate to discuss in some depth the uses to which each of these spaces will be put, and some of the features that are desired.

Facilities for Specific Areas of Instruction

In the elementary school as well as in the secondary school it is necessary to make certain that the building and equipment will include suitable facilities for instruction in each specific instructional field, such as language arts, mathematics, social studies, science, physical education, music, and fine and practical arts. In most of the so-called "basic" subject fields the necessary facilities are not greatly specialized, but (as is the case in secondary schools) the facilities for instruction in science and fine arts, practical arts, physical education, and music require some specialization in design. In order to make certain that the new building will be truly functional in all of these instructional areas, they will be discussed below, one at a time. The requirements for Kindergarten classes and for advanced class work will also be discussed at the outset.

Kindergarten Instruction

The kindergarten instruction spaces will be grouped in two pairs, with the individual rooms in each pair separated by operable partitions. Each space will have a net floor area of 1200 to 1300 square feet. There will will be two toilet rooms for each class, or equivalent. Each space will also have a storage room about 8 feet by 15 feet in size. There should be a plastic-topped counter of child's size with sink and mixing faucet. The counter should be about 16 feet long. There should also be an adult height counter with sink and mixing faucet.

Along one of the fixed walls there should be a set of 56 individual open cubicles. These should be about one foot wide, 8 inches high, and 16 inches deep.

There should be as much wall space as possible, both fixed and operable, committed to tackable surface. A section of chalkboard about 8 feet long should be sufficient. Each kindergarten room should have a drinking fountain scaled to kindergarten children. There should be a lockable teacher's closet for clothing and personal belongings. All otherwise unused lower wall space should be used for shelving for books and for blocks.

Special Classes

The room which is constructed for the special class will have specialized movable equipment, but in basic construction will be similar to other instructional spaces. There should also be:

1. About 16 feet of workcounter with double sink and mixing faucet.
2. An adjacent storeroom, about 6 feet by 8 feet.
3. Large areas of tackable wall surface.
4. A full length wall mirror.
5. An observation room seating four persons, with one-way glass window and access from other than the classroom.

Advanced Work Class (for pupils of remarkable achievement)

There is to be one of these spaces, having 900 square feet of net floor area. This room should have a 12 foot plastic-topped counter with sink and storage cabinets underneath. There should be book shelving with sliding doors, about sixteen feet of chalkboard, and a large amount of

tackable wall, a lockable teacher's closet, and approximately 8 carrels for individual study.

Regular Classrooms

The regular classrooms indicated in figures 1 and 2 should have 800-850 square feet of net floor area. Each room should have a 12 to 16 foot plastic-topped counter with sink and storage cabinets underneath. There should be book shelving with sliding doors, about 12 feet of chalkboard, at least an equal amount of tackboard, a lockable teacher's closet, and about 5 carrels for individual study. It is recommended that this chalkboard and tackboard be installed if possible on the permanent walls of each room or as movable items of furniture on casters, rather than installed on the panels of the operable walls. If the latter situation were the case, it would serve as an inducement to the teacher to keep the operable walls extended most of the time.

Facilities for Instruction in the Language Arts (Reading, etc.)

Under the heading of language arts are grouped a number of areas of instruction which can be referred to individually by more common names. For example, the total language arts area refers to the use of the English language in writing or speaking, both from the point of view of the one who writes and speaks and from that of the one who reads and listens. Common reference to the elements of instruction in language arts is sometimes made under the heading of reading, spelling, writing, grammar, literature, composition, listening, dramatics, and speech. In the traditional school the facilities generally consisted of the usual pupil desk and chair, paper and pencil as supplies (some are specialized in the very early grades), chalkboard for use by the teacher and pupil,

handwriting models for the pupil to observe, and perhaps a stage of some type for work in dramatics and public speaking. In more recent years a great deal of equipment has been developed and is in use partly because it is more convenient for the teacher and in many cases because it is more effective in the instructional process. Tachistoscopes and reading accelerators are used not only in remedial work but also in direct instruction. For instruction in speech a microphone is desirable to go along with the stage setup and of course there must be the necessary speaker system and at least elementary controls. Tape recorders have also been used successfully in the work of speech instruction. The essential requirement appears to be a large number of electrical outlets conveniently located.

It may well be expected that there will be a trend toward more and more sophisticated equipment for use in language instruction in the years ahead. It is not entirely out of the realm of possibility that for instruction in speech and in dramatics inexpensive television cameras and video tape recorders with monitors will be used so that the pupil may profit by listening to and watching his own efforts. Again the only requirements of the building that need be observed for such future possibilities are electric service, and reasonable control of lighting.

Reading

Comprehensive support is required for reading experiences. No single school subject can match it for sheer utility and aesthetic potential. No other tool can more quickly get a pupil to the heart of the matter. Reading laboratories for extending reading skills and exciting the child, and for giving basic aid to those children in

trouble, appear to be appropriate.

Two reading laboratories are proposed for this school, in the Lower House and in the Upper House. Each should be able to accept in individual carrels a total of twenty children. Space for small group learning experiences, and space for individual conferences between students and teacher, should also be provided. Six hundred to seven hundred square feet ought to be adequate for each of these rooms. There should be a console in the middle of each room with carrels around the side. The console, teacher run, should be capable of voice, tape and record transmission, and the monitoring of the carrels.

Speech

A speech program would appear to be of great value. Classroom experiences and library materials could be made to support good speech in part through good hearing. Since the size of speech classes is difficult to determine, and because every room will be well-equipped with general furniture, and allow for multiple use, it is recommended that no specific area be given to this experience.

Facilities for Instruction in Mathematics

There does not seem to be a need for a great deal of specialization in the areas used for instruction in arithmetic in the elementary school. There will be a large number of aid devices used by the teacher, but for the most part they are portable and can be stored in any handy closet. It is well to have available a considerable expanse of chalkboard for use by the pupils and this can either be on fixed wall surfaces or on movable pieces of furniture. Various kinds of projective devices will be used perhaps with particular emphasis upon the over-head projector and there must be suitable arrangement for electrical outlets and for properly hung screens. Mathematics instruction in the elementary schools has changed a great deal in the last generation, but the so-called "New Mathematics" does not require any specialized fixed equipment or specialized areas for its instruction.

Facilities for Instruction in the Social Studies

The various subject fields gathered together under the generic name of social studies are very important sequences in the field of elementary school instruction. The basic areas of history and geography are included, but along with them there are strong infusions of learnings in economics, psychology, sociology, behaviour, and many other concepts. Some are difficult to classify but serve to develop for each youngster, not only an understanding of the world about him, but a tendency to react to his environment both

animate and inanimate, in appropriate ways. Most of the projection equipment used in other subjects will be used frequently in the social studies, including the television screen, the moving picture projector, the slide projector, and the over-head projector.

The approaches to the social studies field in the primary years are relatively simple and in both the primary and the intermediate levels a great deal of the learning is accomplished through activity and project work. The space and equipment requirements for work of this nature are relatively simple and the work generally can be carried out in any classroom-equivalent space or in the project area to be discussed below. Here in particular there can be provided tables capable of accommodating large sheets of paper (for example, large enough to be used as murals), and here can be kept a special store of paints, paste,glues, clay, plaster, and all sorts of supplies used in making relief maps, product maps, paper maché objects, models, etc.

Particularly in the intermediate level there will be a great deal of reference to maps and globes and accordingly there will be a need for facilities for their display.

Space for Science Instruction

Instruction in the field of science in the elementary schools has become much more sophisticated than it was a generation ago. Television has brought into the home a great deal more reference to the world of science in a form which is much more understandable to the child at an earlier age than was provided by any medium in pre-television days. Furthermore, the very growth of knowledge in the field of science itself has made it necessary to compress many more facts and concepts into the instruction provided in the public schools. This has often meant the downward relocation of learnings to the

point where many things that were taught in the early college years in the first quarter of the century, are now introduced in the elementary school. A generation ago the instruction in science in the elementary school consisted largely of use of so-called science readers, accompanied to some extent by such project work as was comparable with the material in those readers.

While it is not to be expected that a great deal of complicated experimental work is to be carried out in a laboratory situation in an elementary school, nevertheless, instruction in science is so important and so complex that a specialized science area should be provided. Accordingly, it is recommended that there be a 600-700 sq. ft. science area in the Lower House and a 1500-1600 sq. ft. science center in the Upper House, each with a suitably adjacent storage room.

Here again the school building must be prepared for not only what is currently being done in the field but for what may be brought into the instructional field in science in the years ahead, and it is certainly reasonable to expect that more science facts and concepts will be taught than are now recognized. For this reason it is desirable that each science center be fitted up with several counter and tabular work surfaces suitable for demonstrations by the teacher. There should be electricity and water services provided.

It is suggested that the materials and procedures involved in such new elementary science programs as that of the American Association for the Advancement of Science be accommodated in this space and the equipment set aside for instruction in this subject.

A storage and preparation area adjacent to the Upper House science center should be fitted with shelving and cabinets and work counter with sink. In this room there should also be a table for the collation and preparation of materials, and a refrigerator with a freezing compartment.

Other features recommended for both science areas include a partial grid ceiling from which various objects can be suspended for experiments; drains in the floors; a source of natural light for growing plants; etc.; and the necessary facility to allow the broadcasting and recording of science lessons on closed-circuit television.

Because of the fact that this school will be located on a relatively large, wooded site, it is expected that its science program will carry a heavy emphasis on natural science. The students will undoubtedly be using the science areas described above for the study of plants, flowers, trees, rocks, insects, and even small animals and birds. Appropriate display and study surfaces should be provided in each science area for this natural science emphasis.

Facilities for Instruction in the Fine Arts (The Project Areas)

Art instruction has a very important place in the elementary school. Young children are easily fascinated by opportunities to apply themselves to creative work in form and color. Moreover, much of the work in art of a creative and constructive nature is very closely related to the project and activity work from which other disciplines draw learnings. In the traditional schools this project work, and also generally the work in art is carried on in the regular classroom, although occasionally some elementary schools have special rooms set aside for the art work.

Among the activities which may be classified as art activities in the elementary school are the following:

Drawing in crayon chalk, pencil, and charcoal.

Painting with easel paint, water colors, and fingerpaint.

Lettering with crayon, paper strips, brush, pen, pencil, and felt pen.

Cutting and pasting with paper, cutout pictures, odd materials, metal foil.

Construction, wood, wire, metal, paper, paper mache, clay, plastics.

Modeling with clay, sawdust, metal, wire, wax, and plaster.

Simple ceramics.

Mural and map making with paints, chalk, paper, crayons, cutouts, and other media.

Weaving with wool and cotton yarn and other materials.

Making of puppets, marionettes.

Printing on fabric and paper.

It may be seen that many of the above activities are involved in project work relating to the social studies in particular. Because these activities require some specialized equipment and space, it does not seem possible to provide all this equipment in every classroom-equivalent, and accordingly it is desirable to have an area equipped with special materials and facilities. Since these activities are so closely related to project work, it is reasonable to expect that the area later described as necessary for project work and the area for art work may be contiguous and actually be two parts of a relatively large activity area. Obviously in the art field special storage is necessary for the various materials:

papers of large sizes, clay, paints, brushes, chalks, inks, yarn, paste, wood, and various other materials. This storage should be, of course, designed particularly for the materials that are to be used. It is necessary to have storage for paper in sizes 12 by 18 inches, 18 by 24 inches, and 24 by 36 inches. This paper is generally stored best on wide shelves, or in wide, shallow drawers with the dimension of the spaces at least an inch larger than the paper on every side.

Generally, elementary school children will work in drawing and painting on a horizontal surface. Accordingly there should be a few tables available which are easily movable and which are large enough so they will accommodate the large sizes of paper that are used.

The tables used for art should be easily cleanable, presumably with a plastic surface, and with a non-glare finish. There should be a sufficient number of the same height so that they can be put together in order to accommodate paper for large murals as well as the 24 by 36 inch art paper that is commonly used. If, for example, these table tops are 24 by 60 inches; four of them put together will make a large work surface. A peninsular type counter with a large stain-proof, easily cleaned, sink with mixing faucets which can be reached from either side is a desirable feature. It should be provided with heavy-duty drains and sink traps. There should also be one section of counter having a sink and mixing faucet that is of adult height for the convenience of teachers.

Generally, the equipment necessary for art will include easels, a chalkboard, a claybin that is rust-proof and air tight and preferably movable, cabinets with adjustable shelving, storage for working projects and for completed work, a jigsaw, a kiln, a toolcart, which will provide

space for saws, hammers, drills, files, chisels, and other tools, and a work bench with a vise. The kilns should include a clay as well as an enamel kiln. There should be a number of electric outlets.

Within each team's overall area, probably in the "project space", there should be some counters, tables, and cabinets adjusted to the average height of the children in these levels. Cabinets and counters should have kick spaces and the tops should be covered with some plastic material such as formica. A tool bench is also desirable, presumably with enough surface for situations where hammers and mallets must be used although it may be convenient to have a section of the counter with hard maple surface. This area requires a lot of display space which can be tackboards of the usual type wherever it is possible to locate them or perhaps there can be some tackable wall space as possible. However, soft wood or corkboard surfaces should not be located on the lower walls. If it is desired to have a completely tackable wall it should be made with some boucle-pattern vinyl covering over a composition board.

The storeroom for art should be well ventilated and should not have any window area since daylight serves to fade colored papers. Some of the storage in art supplies will be wall counters and wall cabinets. It is suggested that as much of the wall space as possible should have this counter and that there should be shelving above it of an adjustable nature. The storage for large paper may well be in the art storeroom but the storage for student projects, either in process or completed, may well be underneath the counters or on the shelving above them.

Facilities for Practical Arts Instruction

In the field of practical art there are only two areas of instruction which are pertinent to the program in the elementary school, particularly in the kindergarten-through-grade-five school. One of these areas involves the use of simple tools which are exercised largely in the constructive work related to projects. The facilities required for this purpose generally consist of a workbench and vise and a toolcart having such simple tools as hammer, saw, file, pliers, etc. These are usually provided in a project area. Such other items as a jigsaw and a soldering iron may also be found in one of these areas. It is of course essential that there be sufficient electrical outlets conveniently located for use of some of these pieces of equipment.

The other area of practical arts instruction is that of home and family living. It may be expected that in the junior high school or in the middle school the pupils will have an opportunity to study such matters as nutrition and cooking, sewing and clothing, and child care, on an organized and continuous basis. Moreover, in a K-5 school it cannot be expected that organized courses in home economics have a regular place in the program. However, the provision of certain facilities will make it possible to introduce simple units in nutrition, child care, and in the making and care of clothes.

It may, of course, be expected that these facilities will need to be provided only for the older children in the school, and that they will not be in a separate room or laboratory but in an area contiguous to or actually a part of the project area. Among the equipment items to be provided are a refrigerator, an electric range, a work counter and sink, some sewing

machines with tables to accommodate them, possibly as many as five, an ironing board, various storage cabinets, and a fitting booth with mirror.

Facilities for Music Instruction

Instruction in music will require special spaces that are separated from the rest of the school by partitions or space dividers which are substantially resistant to the transmission of sound. It is presumed that two such spaces will be necessary and, if properly designed, the platform of the cafeteria/auditorium can be used as one of them. This platform should have an area of at least 600 square feet, and adjacent to it there should be a storeroom for the storage of musical instruments and supplies. For the younger children these will presumably consist of simple items used largely in rhythm work. For the older children there will be more sophisticated musical instruments.

There should also be a special room available for music instruction with total net area of about 600 square feet. This room should have adjacent to it an office or workroom for the music teacher, a storage room for instruments, with appropriate shelving for them, a storage room for folding chairs of which approximately 50 should be supplied, and for a set of folding risers which may be used on the auditorium stage. In the music office there should be filing cabinets for the music files, and specially lockable storage for hi-fi, record player, tape recorders, and radios. In the music room there should be a work counter with a sink having mixing faucets. There should also be a drinking fountain. The music room should be divisible into two approximately equal parts by a sound resistant operable partition. This room should also be provided with a chalkboard having a map or chart rail.

Facilities for Physical Education

For elementary school children, the state requirments call for a minimum of 90 minutes each week in physical activity. Presumably this requirement may be met by three thirty minute periods during the week, although it may well be expected that many schools will offer more than the minimum and have possibly four periods of physical activity. It may be expected that there will also be some instruction in health or first aid for the older elementary pupils which may well be accommodated by one period each week, making a total program of physical education activity and instruction amounting to five periods a week or one period each day.

To house these activities there will be one divisible gymnasium, with locker room and shower room facilities (for both sexes). It will be assumed that these locker and shower facilities will receive extensive after-school and evening use by older children and adults.

For the kindergarten children it may be expected that physical education activities will be relatively simple games and rhythm. Much of this may be done directly in the kindergarten classrooms.

In the rest of the school there will be a total of 22 classroom equivalents, each of which will consist of an average of twenty-five pupils (actually, the special class may be slightly smaller). If each one of these 22 groups is assigned three half-hour periods of physical activity per week, there will be sixty-six periods per week dedicated to this work. Since the school day contains at least five hours, each side of the double gymnasium will accommodate approximately ten groups of pupils each day. Accordingly, there are two instructional stations each available up to about ten periods per day for the five days in the school week. There are 100 available station periods to accommodate the 66 group periods. Hence, there

is adequate space for more than a minimum program, and it may not be necessary to assign pupils at the rate of 10 periods per day.

The gymnasium floor should be perhaps 105' to 110' long which will allow run-out space from a basketball court 84' long. The floor also should be wide enough so that cross courts on each side of the dividing partition may be lined out with a length of at least 60'. Again there should be some run-out space, perhaps four or five feet on each end of these cross courts. At either end of the large basketball court there should be glass basketball backboards, adjustable in height from 6' to 10'. At each end of the cross courts there should also be basketball backboards adjustable in height from 6' to 10'. These backboards should be retractable. There should be drinking fountains and cuspidor units recessed in the wall on each end of the gymnasium.

Locker and Shower Rooms

It is largely the probable use of these facilities by the adult community or by older children during after school and evening hours that makes it desirable to have a locker room and shower room for each sex. If the pupils enrolled in the school are not to use gymnasium uniforms, it is not necessary to have any box lockers or basket lockers for these materials. If this is so, all that is necessary is to install clothing lockers.

Assuming that there may be two groups of twenty-five pupils using the gymnasium at any given time, and assuming that in situations involving the upper house, there may be a group of girls in one half of the gymnasium and a group of boys in the other half, it is desirable that the locker room accommodations be sufficient in each area, that is, for both boys and girls. It is recommended that there be approximately 30 clothing lockers in the girl's locker room and 30 clothing lockers in the boy's locker room.

Since it may be the policy of the physical education department for the oldest group of students in this school to change into physical education uniforms and to take showers after the exercise, it might be necessary for this group to have locker accommodations for these uniforms. There are in general two major types of these accommodations which have been used in schools. One is the box locker system and the other is the basket system. The basket system requires somewhat less space in the locker room but it is not the better system since materials may be pilfered from the baskets, the baskets may get thrown around and damaged, and the racks on which they are usually stored, although presumably movable, are nevertheless very difficult to move in most cases. Accordingly, we recommend that the locker rooms be made large enough to accommodate a system of box lockers.

In-as-much as it may be expected that there will be about 100 pupils in this upper age group, it would not appear that many more than this number of box lockers need be provided. To allow for some irregularity in numbers, it is suggested that there be approximately 50 box lockers in the girl's locker room and 50 box lockers in the boy's locker room. If possible, these should be arranged around the walls of the locker room, or in centrally located stacks not more than 3½' tall so that the physical education instructor can see completely over them from any part of the locker room to make supervision effective.

If these locker rooms are to be used for changing clothes, there should be benches between the rows of lockers. One row of benches between any two rows of lockers will presumably be sufficient but it is desirable that the locker banks be at least six feet apart.

A schematic layout of the locker and shower rooms in relation to the gymnasium is shown in Figure IV.

It will be noted that the separation between the locker space and the drying space and between the drying space and the shower space is merely a curb. If the only lockers in the locker room other than those on the wall are short and do not have tops more than 3½' above the floor; and if there is no partition other than the curb between the locker room, drying room and shower room spaces; then supervision of these areas will be relatively easy for the physical education instructors and for those who are in charge of after-school and evening recreation periods.

There is one important point which needs emphasis here. Too often the locker room floors are left in bare concrete, generally with a hardener applied. However, concrete under shoe traffic always begins to wear off, forming dust. The usual recourse in this situation is to paint the floor. However, this is not satisfactory because the paint soon wears off. Repainting is required, and the floor never really looks good and never can be considered cleanable. The best practice is to use tile on the locker room floor. It is just as important to use it here as in the shower room. Either a ceramic tile or a quarry tile or even a terrazo surface may be used.

Figure V shows a diagram of types of lockers which are suitable for use in the locker rooms. Unless and until a definite decision is made to have the upper grade pupils change their clothes for gym periods, it is suggested that the box lockers be omitted, but the locker rooms should be large enough and so laid out that box lockers

can be supplied when necessary. The general order of layout of the facilities in the boy's and men's side of the physical education suite will be an office for the instructor with a supply room conveniently close. Beyond this will be the locker room and it is suggested that there be direct access to this from the gymnasium as well as from a school corridor. Between the locker room and the shower room there should be a space of open floor which might be called drying space. This does not need to be large but should be located as shown in Figure IV in order that some toweling can take place before the participants get back to the location of their lockers.

The typical school shower room for many years had the shower heads around the walls of the room. Generally it was necessary to build a partition partway across the center of the room in order to have enough wall surface to accommodate the necessary number of shower heads. This partition usually interfered with supervision of the shower room. One of the systems which has been gaining favor is the use of pole-type showers where metal poles are spaced on 8' modules and on each pole there are four, five, or six shower heads. This arrangement is quite economical of space and is very easy to supervise.

The layout of lockers and showers for the girl's or women will be quite similar to that for the boys and men. There will be an office for the physical education instructor, there will be a storage room nearby for towels and other materials, the locker rooms will be practically a duplicate of what has been described, there will be a drying space separated from the locker room only by a curb, and the shower room will be separated from the drying room only by a curb. In many parts of the country the shower room for girls and women is laid out as an exact

duplicate as that for boys and men, but in New England particularly, there is a tendency to set up panels and compartments for the women's showers. Here again the pole shower arrangement can be used although there will be only four shower heads to a pole, each one giving a shower in one of four compartments arranged around the pole. Adjacent to each shower compartment, there should be dressing compartments. Because of the use of these compartments, the girl's shower room may take more space than the boy's shower room for the same number of shower heads.

Inasmuch as the average class of either boys or girls using the gymnasium will consist of 25 pupils, and since it is unlikely that all of these people will be ready to take a shower at the same time, it is suggested that 20 shower heads are sufficient in each shower room.

There should be a toilet section in each of these locker and shower room suites, and since the facilities will be used by adults as well as children, the stools should be adult size. Inasmuch as the number of people using these facilities at any one time will be relatively small, there is no need for a large number of fixtures; probably two stools and two urinals will be sufficient for the boys' side and four stools for the girls' side. Four lavatories should be sufficient on each side. Wall space should be left for mirrors in the locker rooms and these should be of a size and so mounted that they can be used by middle grade children as well as adults.

It is suggested that the physical education instructors offices may well have 180 to 200 square feet of floor room area and should include within this area some space for lockers, toilet, and shower stall. The adjacent storage

room will be used for the storage of small physical education equipment and towels and should have about 100 sq. ft. of floor area. In addition to these storage areas, there should be two relatively large storage areas - one for each end of the gymnasium for physical education equipment. Since these storage areas must accommodate game stands, spring boards, vaulting poles, etc., it is suggested that each of them have approximately 200 sq. ft. of floor area.

There should be a direct entrance to the gymnasium from the outside of the school and a small lobby should be constructed at this entrance with men's and women's toilets accessible directly from the lobby.

It should be pointed out at this time that the 2400 sq. ft. community room should be located in close relation to the gymnasium. It should be accessible from the outside without entering the remainder of the school. Adjacent to it in this recreational complex there should be an office of approximately 120 sq. ft. of floor area for the person supervising after-school recreational activity. There should be also a storage room with at least 200 sq. ft. of floor area and it is expected that this storage room may be divided up into a number of storage bays or cages which may be assigned to outside groups such as the Boy Scouts and other community organizations.

It also seems desirable in these specifications to call attention to certain common developments which should be avoided. One of these is the use of baskets for the accommodation of physical education uniforms and gymnasium shoes. The so-called basket system probably was developed to use as little space as possible and it probably does use less space than box lockers. However, as already indicated, the baskets are subject to pilferage, breakage and are very awkward in their use. This system should be avoided.

Another arrangement which should be avoided is a shower system where the pupils are sent into the shower room and the instructor from the outside, sometimes looking through a window, manipulates the shower controls. It is much better for the persons taking showers to be able to control the water themselves.

Still another arrangement to be avoided is the situating of lockers on cement curbs raised to the height of the benches with the benches fixed directly against the bottom of the lockers so that a person using his locker must get up from the bench and turn around to open it. This is a space saving arrangement, but it is also an awkward arrangement. Another problem with this arrangement is that it raises the lockers so high that even if they are short lockers they make a dividing wall which interferes with the supervision of the locker room.

Figures IV and V follow:

FIGURE IV

GYM/LOCKER COMPLEX

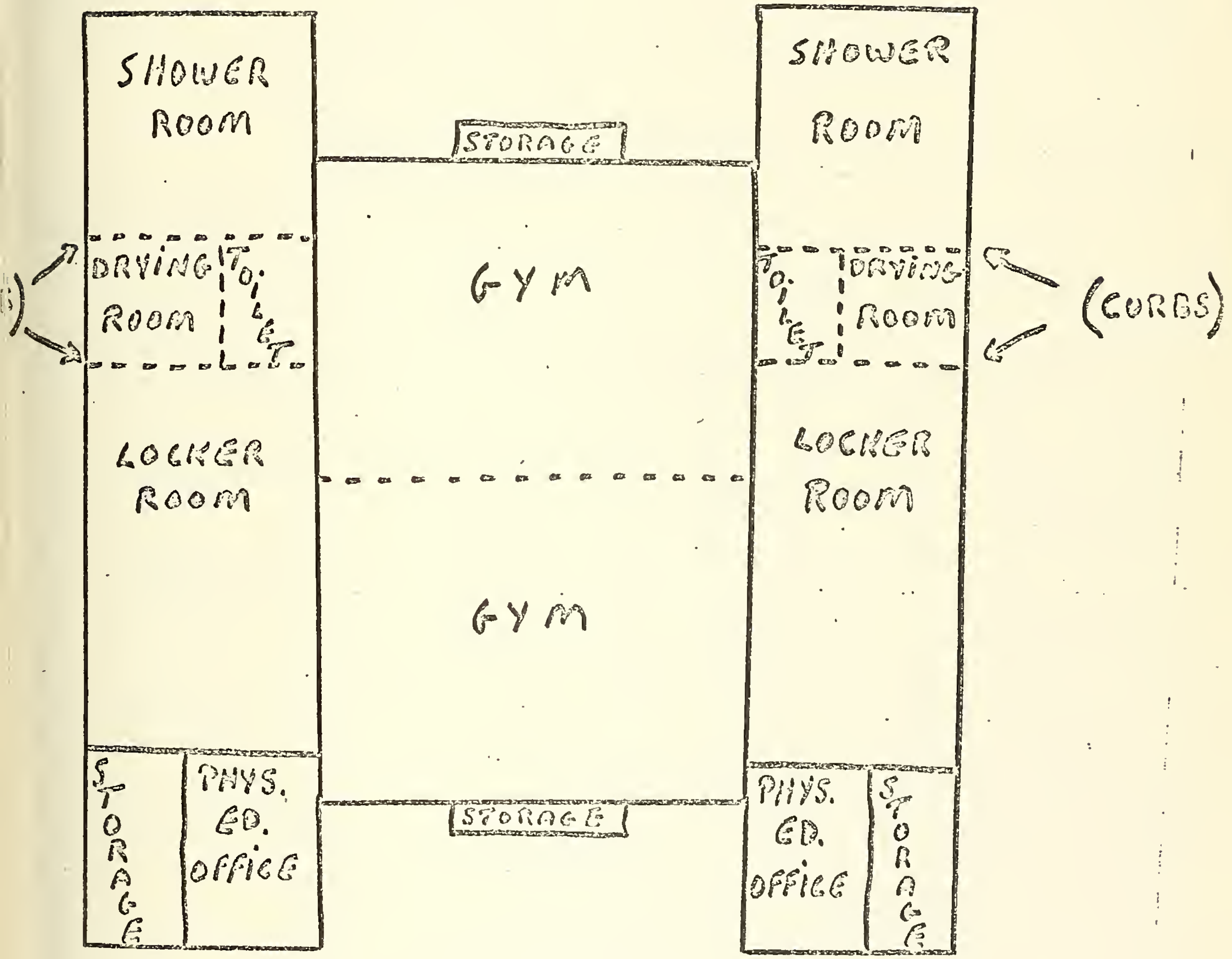
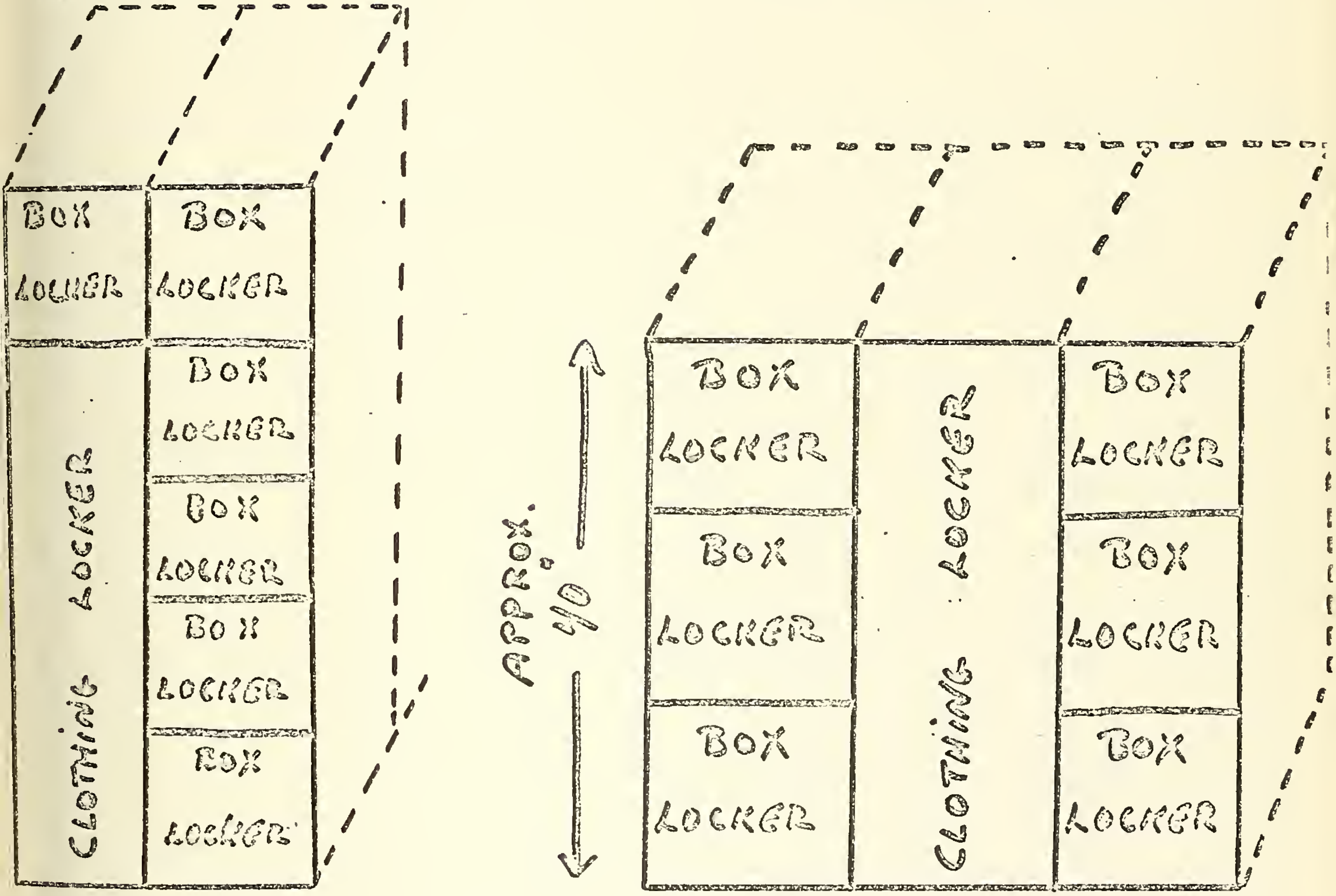


FIGURE IV

SCHEMATIC FOR LOCKER ARRANGEMENTS



FOR USE AGAINST WALLS

FOR USE IN INTERIOR OF ROOM

OUTDOOR RECREATION AND LEARNING FACILITIES

The Council of Education Facility Planners (formerly the National Council on Schoolhouse Construction) lists several general principles to serve as guidelines for elementary school playground planning:

"Outdoor instructional activities for kindergarten and lower elementary grade children should include space for a variety of games on grassy or covered areas. Outdoor play facilities for children at this level may include sandboxes, space for informal games, and appropriate physical development apparatus, such as climbing structures. Locating kindergarten and lower elementary grade recreation areas away from areas assigned to older children, and in close proximity to any special entrances or rooms for children of this age level, deserve special planning attention. A hard-surface area for the use of wheeled toys or certain games may be desirable.

Upper elementary school children require activity areas suited to their particular development needs, interests, and abilities. The total site area and degree of its development will be substantially greater than those for primary groups. The area for girls in this age group may include a few pieces of play apparatus, but should be devoted largely to space for informal games. Shuffleboard and hopscotch are desirable. Boys in this age group require unobstructed areas planned for organized games and sports, such as softball or touch football. Marble rings may be laid out along the edges or in the corners of the playground. Paved areas for rollerskating are highly desirable for both boys and girls."

The advice of the Stanford School Planning Laboratory in regard to elementary school playground planning is quite similar:

1. Playgrounds should allow for efficient supervision. Those activities requiring the most supervision should be near the school building.

2. Adequate and convenient toilet facilities and drinking fountains should be readily available.

3. Playgrounds must be planned for maximum safety with grounds free of holes and ruts, debris, rocks, and other hazards. Fencing around play areas is necessary to prevent children from trespassing on the property of others and to prevent their running onto highways and streets. Fencing may also be needed to separate certain activities on the school grounds. Schools having kindergartens and separate primary grades should have individual play areas which are protected from the older children.

4. Play areas should be developed for use by the entire community for recreational purposes.

5. All playgrounds should contain the following basic areas:
    a. an apparatus area
    b. a hard-surface area
    c. a turf, natural, or stabilized soil area.

It should be pointed out that in all this discussion it is recommended that there should be a separate playground area for the kindergarten children, completely fenced off from the rest of the playground area

and immediately adjacent to and opening out of the kindergarten areas in the building.

Playground Size

In regard to the desired square footage needed for an adequate elementary school playground, Harvard University in November, 1961, as part of its "Boston School Study," made certain recommendations. For example, the requirements of K - 6 elementary school with an enrollment of approximately 1,000 students are as follows:

dual use hard surface area	50,000
dual use turf area	161,000
primary apparatus area	6,000
upper elementary apparatus	6,000
	223,250 sq. ft.
	(approximately 5 acres)

The space recommendation for elementary school playgrounds most relevant to the situation in the new schools in Boston is that made by the Milwaukee County Park Commission in 1966, and endorsed by the Boston Parks and Recreation Department. This recommendation states very simply that the minimum play area for any elementary school should be three acres.

Three Components of a Playground

It has been recommended that all playgrounds contain a hard-surface area, a turf or stabilized soil area, and an apparatus area. Certain specific suggestions can be made for each of these areas.

The Hard-Surface Area

This area is especially usable for court games, including basketball, volleyball, and others. It should be an all-weather surface which can be used soon after a rainfall or snow. It will provide freedom from dust and mud, thereby reducing school maintenance and operation costs. Various types of hard surfaces have been used including cement, plant-mixed asphalt, natural rock asphalt, emulsified-asphalt, and more modern synthetic materials. Cement is no longer a popular playground surface, however, because of its abrasiveness and its hardness underfoot.

Modern playground designers are leaning increasingly toward synthetic materials, such as Rub-Kor (a rubberized asphalt), En-Tout-Cas, Grasstex, and U. S. Rubber Athletic Surface Concentrate. The advantages of these surfaces compared to asphalt are their relative softness underfoot, their resistance to cracking, and the fact that they may be prepared in various colors more cheerful to the eye than conventional asphalt black. A disadvantage of these synthetics is their relatively high cost. Regardless of what material is used, the hard-top surface should be smooth, without excessive waves or indentations, and should be graded properly to provide adequate drainage. The surface material should be selected with an eye toward repair. Also, in view of the community use of these Boston schools, it is possible that part of the hard-surface area of each playground will

be used from time to time for the parking of 20 to 40 cars. Consequently, at least this section should be covered with a surface tough enough for this purpose.

The Turf or Stabilized Soil Area

Turf is probably the best surface for most types of physical educational activities. However, if this area is used intensely, it is difficult to maintain without periods of rest. Therefore, in an urban school playground, natural or stabilized soil or even a synthetic surface, is fairly porous and provides a good surface. Sand/clay combinations are being used in numerous cities. Some schools are using a clay-sand-gravel combination, composed of torpedo gravel with thirty percent sand. All of these surfaces will generally show ruts after rain or snow and can be used again only after they have thoroughly dried. This fact indicates a need for adequate drainage ditches and proper grading, plus periodic maintenance, in order to keep a safe and usable playground.

Stabilized soil is soil that has been treated with a binding material, thereby making a firm surface. It generally is less expensive than grass so far as maintenance is concerned. Some of the materials which have been used in this stabilization process include asphalt, cement, resin, and rock salt. One of these compounds usually is mixed with existing soil and spread over the area which has been thoroughly loosened. It is important that the soil be analyzed carefully before this operation is started because of the quality of the soil determines the amount of water and stabilizer necessary to get the best results.

It should be noted that some modern playgrounds in the U.S. and Europe are eliminating the turf section altogether in favor of a Rub-Kor type synthetic surface throughout the entire playground. Maintenance is simple, and the resiliency of this material is such that it closely resembles turf for play purposes.

Whenever possible in this area, it would be advisable to include a track and jumping pits. Both running and jumping are now included in the various National Physical Fitness Tests which have been set up by the President's Council on Youth Fitness.

The Apparatus Area

The apparatus area should have a surface that will give adequate protection from falls. A variety of materials can be used. Tanbark shavings, sand, loam, sawdust, turf, or a Rub-Kor type surface are all possibilities.

The apparatus itself should be such as to encourage active, creative, and spontaneous play. Most modern playground designers assert that inflexible contraptions (slides, roundabouts, etc.) are not as good as half-finished components and materials which stimulate the children's imagination. For instance, it is felt that a tree for climbing is better than a swing, and building blocks, better than a slide. The use of rings, horizontal bars, and horizontal ladders affords good exercise for older children. Some schools have made effective use of large drain tile as crawling tubes for small children. Drain tile provides good exercise, but it is hard on clothing if it is not placed a little above the ground and kept

clean. Only equipment of sturdy construction should be selected. All joints and moving parts should be provided with safety guards to prevent pinching and shearing action.

Location of apparatus is important from the standpoint of supervision, safety, and economical use of space. Apparatus may be placed to advantage near a school building where the noise created will not be a problem and where it is readily accessible and easily supervised. If revolving or swinging apparatus is used, it should be placed either along a fence where there will be little danger of children running into it, or safety railings should be provided. The lines of motion of adjacent pieces of apparatus should be parallel to reduce cross motion and resulting danger. Ample space for safe use should be provided around apparatus, but it is advisable to have it grouped so as to occupy as little room as possible. It is a good plan to locate permanent equipment and spaces, such as basketball goals, jumping pits, and horseshoe pitching lanes along one side of the older boys' playing area. Soft landing places should be provided for horizontal bars, horizontal ladders, and jumping pits. Outdoor chalkboards and other writing surfaces are recommended for teachers who wish to have a classroom outdoors -- and for children who may play teacher on a Saturday morning.

The Multipurpose Community Playground

In any case, regardless of where the elementary school playground is located, certain basic aims are suggested. The playground should serve the physical educational-recreation needs of the school children. It should also serve the community's needs to the extent that after school hours, on week-ends, and in the summer the playground facilities will be available to the children and adults of the neighborhood. It should also have a

natural science education function. Garden areas should be maintained by the children; and the study of the life process of flowers, shrubs, and trees encouraged. Finally, an artistically planned playground should serve, through proper landscaping, to beautify the school and the neighborhood. Trees should be preserved whenever possible, and planted imaginatively in those areas where space will permit. A combination of surface materials could be used in each playground (grass, asphalt, or synthetic materials on the play area, connected or separated by brick or cobblestone walks) to create a pleasing contrast in colors. Outdoor lighting, to accommodate evening use of a specific area of each playgroun (for instance, the basketball area), is recommended.

In short, to fulfill its function as part of a true community school, the elementary school grounds should serve all of these purposes, and be planned for total usage.

The Georgetown School Site

The site for this school in West Roxbury is approximately twelve acres in area and offers the architect a good opportunity to develop outdoor play facilities. One can assume that the school building itself, plus a parking area, will probably occupy about two acres of the site, leaving ten acres to be developed for other purposes.

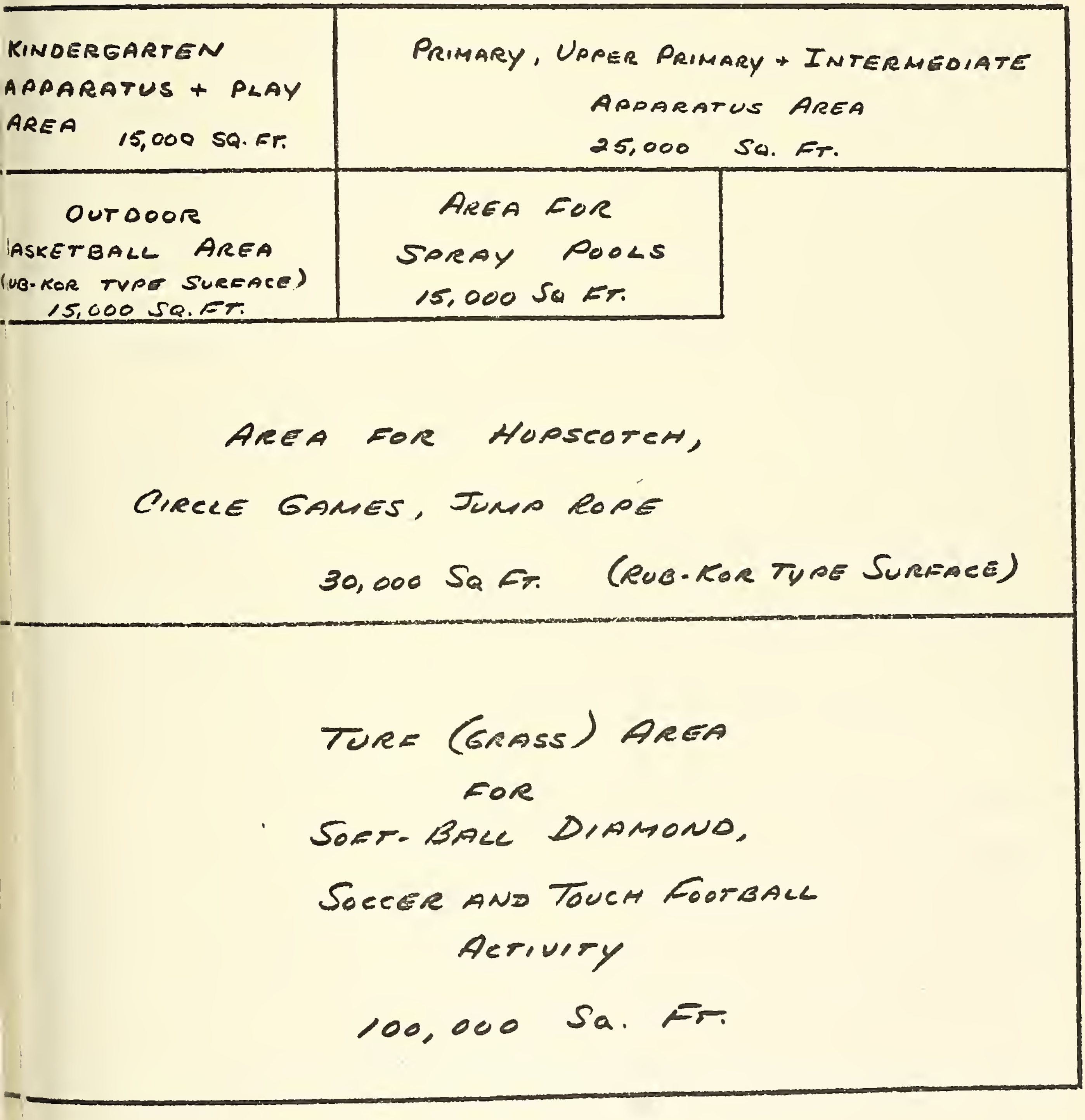
Because of the beautiful woods on this particular site, and the opportunity they provide for the development of a rich natural science program in the school, we do not recommend that the entirety of the site be developed as a conventional playground. It is our suggestion that at least three acres of wooded area be preserved. "Nature trails" can be cut through these woods as the natural science program develops.

A schematic diagram on the following page (Figure VI) indicates the types of play areas which are recommended for the remainder of this site (five acres). It should be noted that this schematic design is to serve only as a guide for relative area sizes, and does not attempt to guide the architect with reference to the location of the various areas.

FIGURE VI

PLAYGROUND FOR GEORGETOWN SCHOOL SITE

A SCHEMATIC DESIGN ONLY



TOTAL AREA = 200,000 SQUARE FEET

Instructional Materials Center (IMC)

The IMC in this new school should be a facility designed to implement a broad educational program. This program will probably include the following components: Library services, audio-visual aids, instructional television, and computer-aided instruction. The physical facilities needed to carry out these programs will be located in the IMC. Housing these materials in a central location will minimize expense and duplication of materials.

a) Library services

A strong central library with office facilities for the librarian and a work conference room for cataloging, book repairs, and librarian staff meetings is necessary to coordinate a library system.

The librarian's office should be located near the movable charge-out desk in the library. The office should contain 150 sq. ft. of space and be separated from the main library space by a glass partition extending from waist height to the ceiling to permit the librarian to observe the main library area while working in her office. The office should be furnished with a desk and typewriter, two chairs, a legal size filing cabinet and a three foot long, waist high book shelf. Several electrical outlets will be necessary.

The library work-room should include 200 sq. ft. of space. It must include a sink with hot and cold running water and water resistant work-tables; a long counter built adjacent to the sink, a shelf list cabinet, an oversized cabinet with drawers at least 24" x 36" or larger for storing posters, etc. (All wall space should be used for shelves and cabinets except that the room must contain at least two double electrical sockets). The wall separating the workroom from the library should be of glass from waist height to the ceiling to permit

observation of the main library. A table and chairs must be included so that the library staff may use the room as a social room during coffee breaks; and so that the librarian may use the room to hold meetings to plan with members of teams.

The 2000 square foot main library space should include a charge-out area, shelving, tables, carrels, and a story area.

The charge-out area should be located so that it is convenient to major exits. The charge-out desk should provide trays for book cards, a depressible book unit for desk supplies, shelf space under the counter, a money drawer, and a counter and sitting height work area which will accommodate at least two people. A modified card catalog of a type which can be added to as necessary, should be placed in this general area.

The main library space should include a story area large enough to seat approximately 30 pupils. It would be desirable if this could be in an area recessed into the floor so that children could sit on steps leading down to the recessed floor. If cost and engineering considerations prevent this, a quiet section separated from the main library should be planned. If necessary, this separation could be accomplished by placement of shelves. The area should contain a few low shelves and several benches. However, many children would prefer to sit on the floor, so that benches seating 10 to 15 children would be sufficient. We envisage that the story area would provide the librarian with a chance to work with groups of children, and would provide a vehicle to introduce the younger children to the idea of a library as a comfortable, enjoyable place.

An important part of the library will be the main reading area. This reading area should have a minimum seating capacity of 50. This requires four round tables suitable for study or discussion, four long tables suitable for study or reading, and 30 acoustically treated individual study carrels.

(b) Audio-visual services

At least 15 of the 30 carrels in the IMC should be electronic in order to give the children the opportunity to experience the new technology of learning. These electronic carrels will permit a wider range of independent study, allowing film loop viewing, taped TV programs, and other experiences presented only to large groups in the average elementary school.

In addition to electronic carrels, one portable electronic listening unit containing headsets, tape recorder, and record player should be located in this section of the IMC to accommodate group listening activities.

It should be pointed out here that rack and shelf space must be provided in the IMC for tapes, tape cartridges, film loops, filmstrips, records, and movies. Perhaps it would be best to locate such storage space near the librarian's office or near the person serving at the charge-out desk. All pupils must be able to get this material and use it by themselves if the IMC is to be utilized fully as a resource center.

(c) Instructional Television Services

It is not anticipated that the IMC will contain a great deal of television -

related equipment. It can be recommended, however, that the IMC contain air-conditioned storage space for TV tapes and that the electronic carrels be designed to present these tapes on a small video screen.

d) Computer-aided Instruction Services

Computer-aided instruction in elementary schools is in the developmental stage, and it is therefore hard to prescribe at this time exactly what facilities will be necessary in the IMC to implement this technique. Certainly, one can recommend at this point that space in the IMC (300 - 400 sq. ft.) be included for future use as a computer-aided instruction area, and provision should be made for the future installation of computer terminals in this area.

What one hopes to achieve in the Instructional Materials Center for this school is an appealing situation which will attract children. It would seem that the IMC must be centrally located in the school, and it is recommended that this space be made as accessible as possible. As many walls as possible should be omitted so that the nearby instructional complex will "flow" into the IMC.

It is recommended that the IMC be located within or near the Upper House. For the children in the Lower House, it is recommended that

the concept of a satellite library be developed. A satellite library is simply a space in the common learnings area of the Lower House * in which books perhaps 300-600 volumes, can be displayed. These books can be placed on bookmobiles or rolling, double-faced, waisthigh shelves. Bulletin boards should be available in the area of the satellite library so that book-related displays can be set up. The racks, bookmobile, and a few adjacent chairs, benches and tables will occupy about 200 square feet of the common learnings area. Thus, this satellite library will be directly accessible to children in any of the classroom equivalency areas served by that common learnings area. The children can come to get books when their work is done, during special periods designated for reading, or on their way in and out of class. This system will make a library available to every classroom, giving teachers an opportunity to use library books as well as texts in their classes, and giving more children an opportunity to read. Because the common learnings area is open and is adjacent to classrooms, the satellite library will always be under supervision. When necessary the satellite bookmobile can be rolled into a classroom for a lesson.

Audio-visual materials should also be made available to the children in the Lower House through this satellite library. One of the elevators which have been suggested for this school can be used for the transportation of books and equipment between the central IMC and the satellite library.

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* It is not an additional space. It is simply part of the common learnings area.

N.B. The architect should also explore the feasibility of a split level IMC, or a two-level IMC, serving each House equally.

COMMON LEARNINGS AREA

The common learnings area is unique to elementary schools in that it attempts to make productive use of the floor space which in most schools is largely wasted; namely, the corridor space. Granted that it is necessary to provide access from one part of the building to another to insure pupil safety and allow for rapid evacuation of the classroom areas in case of need (e.g. a fire), in most schools the corridors (which are also known for their institutional effect) are idle for the larger part of the school day. Acknowledging that the elimination of expensive, underutilized corridor space reflects a significant improvement there is a more important reason for the inclusion of the common learnings areas in the new schools.

In the light of the instructional program we envision this building will facilitate, it seems highly desirable to arrange for spaces in the new schools to accommodate instructional experiences beyond those provided in the classroom areas. More specifically, spaces are needed that may be used by small groups and individuals engaged in activities and projects which are an extension of classroom work and may be considered a key area for special learning activities.

Location and Size

The common learnings area for a team center of 150 pupils should have a floor area of 1,500 to 1,600 feet, and for a team center of 100 pupils a floor area of 1,000 to 1,100 feet. This area should be immediately adjacent to each team center. The shape of the common learnings area will be dictated by the architects' arrangement of the team center and has little, if any, effect on its eventual utilization. Since the wall which

separates each classroom area from the common learnings area is to be operable, it is possible to imagine the classroom area flowing into the common learnings area when the "wall" is moved. In effect, the common learnings area provides an extension for each classroom area, an extension which can be used for large-group, small group, or individual instructional purposes.

Large-Group Instruction

The common learnings area can effectively serve as a center for large group instruction when the operable walls between this area and the classroom areas are retracted. In the elementary setting, such activities as handwriting instruction, music, creative writing, and other lessons of a demonstration nature can be conducted with large groups using a combination lecture-audio-visual approach. For example, handwriting can be taught to a large group by one person utilizing an overhead projector. At the same time, the other members of the teaching team may circulate around the area providing individual help to students. The amount or variety of large group instruction adaptations available to the teaching team is limited only by their creativeness as a planning unit.

Small-Group Instruction

The common learnings area is located so that it can provide the relative privacy needed by small groups while, at the same time, allowing for teacher supervision of the group's activities. This area can also be furnished to accommodate several small groups and their work materials simultaneously.

To meet adequately the needs of small groups, each common learnings area should contain four or five round tables, each with four matching chairs. These tables should be scattered throughout the open space of the common

learnings area to provide the small groups and the students working on an individual basis in the area with some visual and acoustical privacy. The tables can be separated for group work by using mobile bookcases which can be easily moved around the area and be used as space dividers. It is also assumed that some small groups will want to meet and work on the carpeted floor.

Individual Work

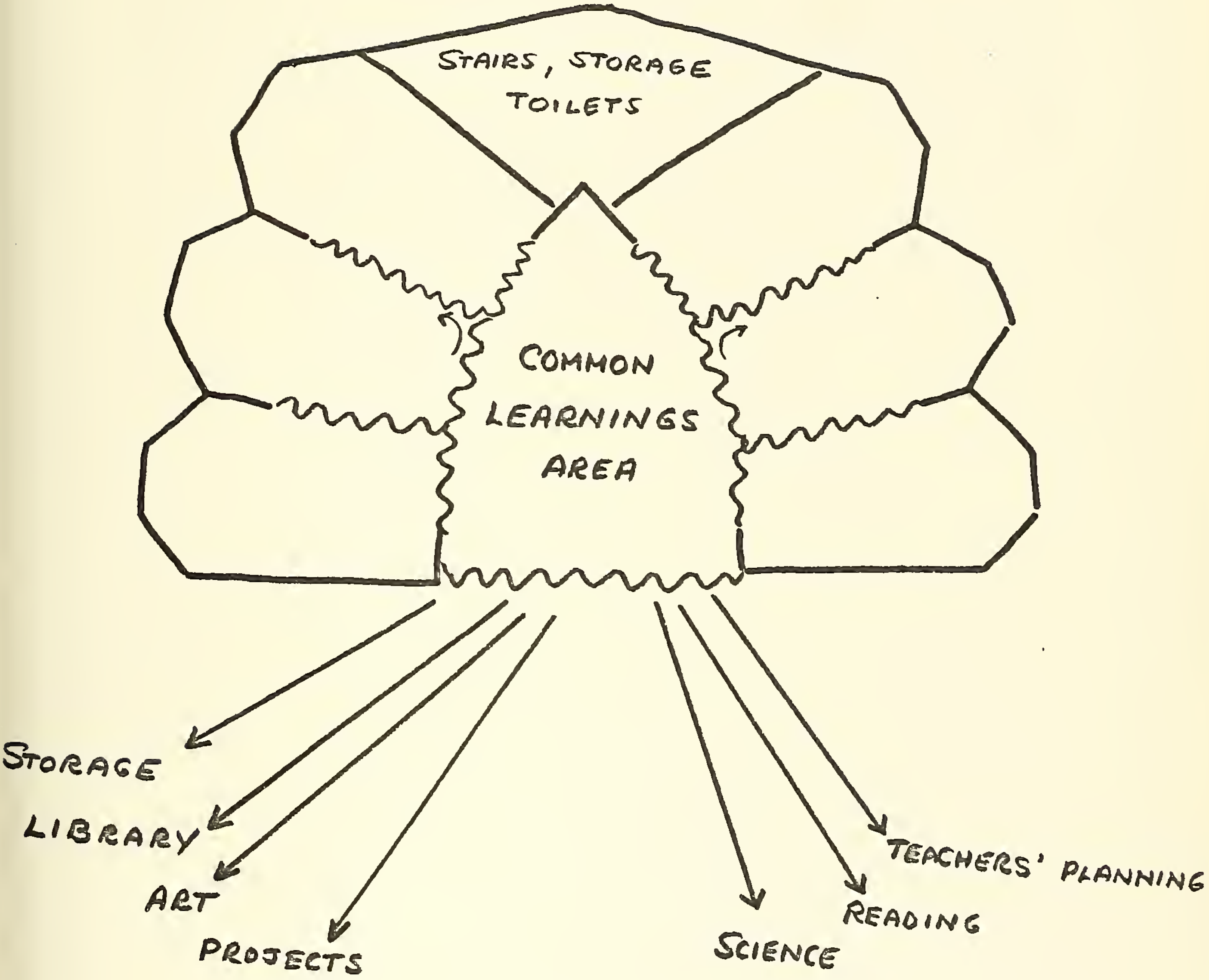
Special emphasis in new patterns of elementary school organization is being placed upon providing more time during the school day for individual work. Individual work may consist of a tutorial situation where the teacher works with the student on a one to one basis or independent study where the student is completing an assignment, a project, or free reading on his own. With the advent of electronic teaching aids and programmed instruction, more attention than ever must be given to planning school facilities to accommodate individual work.

The common learnings area can also serve as a fine facility for individual work. The table and chairs specified for small group work will also serve adequately for independent work.

Shape of the Common Learnings Area

In Figures I and II the relationships of the common learnings area to the classroom was merely shown as contiguous. In Figure VII which follows on the next page, a more specific possibility is shown, in which the two clusters are slightly spread open so that there is created a mitre-shaped area with the capability of handling traffic but also handling a variety of other activities. It can be seen that when the operable classroom walls are all receded there can be created an exceptionally large and fluid space.

FIGURE VII



SCHEMATIC OF 6-CLASSROOM TEAM CENTER
WITH MITRE-SHAPED COMMON LEARNINGS
AREA

Figure VII could also be modified so that the common learnings area is shaped like an isosceles triangle, even perhaps an equilateral triangle.

eam Classrooms: Additional Requirements

There is a need for display spaces on such walls as are available, primarily the fixed walls. Tackboard panels of cork or fiberboard have been commonplace in schools for many years. For many years corkboard was considered the best material to use for tackboard, inasmuch as the cork was self-healing when the tacks or pins were removed. It is possible to obtain corkboard in a limited range of colors.

However, within recent years the use of vinyl fabric glued to a fiberboard has been found very satisfactory. The vinyl fabric is reasonably self-healing when the pins and tacks are removed and the fabric may be obtained in an almost unlimited range of colors.

A variation has been to make complete walls from floor to ceiling out of tackboard materials rather than having them in a bounded panel area. Sometimes schools have used soft wood from the floor up or corkboard from the floor up. The difficulty with these materials is that both get soiled very easily and are very difficult to clean. Furthermore soft wood does not heal well after the tacks are removed, and soon achieves an unsightly appearance. On the other hand, a vinyl fabric over fiberboard can be used for entire wall surfaces from floor to ceiling and since vinyl is easily cleanable and does not stain easily, the wall surface remains attractive.

The general practice in elementary schools is to provide a work counter and sink with hot and cold running water in each classroom. This makes a ratio of one such installation to approximately each 25 pupils. These installations require plumbing and presumably electric service, and accordingly it is perhaps best to have them arranged along a fixed wall in each case. Inasmuch as there will be relatively little fixed wall in the house spaces except for what might be called the window wall, it may be best to arrange the counters in that part of the space.

These counters should have plastic surfaces equivalent to formica. A splashboard of similar material should be provided.

Figure VIII illustrates how a workcounter and sink can be arranged, located against some portions of fixed wall in the classroom-equivalent spaces. Also indicated are possible locations for the storage of movable wall panels of operable partitions so that they will be available and conveniently accessible.

Teacher Planning Space

For each of the Upper and Lower Houses there should be a suitable teachers' planning and workroom space. This may be an area which is not set apart from adjoining areas by walls or other space dividers, but preferably it should be a space in the nature of a teachers' workroom, separated by partitions (possibly glass with draw curtains) from the rest of each house space.

In addition to the teachers' planning and workroom space, there will be a teachers' private lounge and rest area for the school as a whole. This will be discussed later as a separate topic.

The teachers' workroom is a space where all of the teachers in a team may work and plan together. This may occur when there are no pupils at hand to be instructed, or one or more teachers may work in this workroom while the instructional work with the pupils is being carried on by the remainder of the team faculty. There should be some teachers' desks in this room, although the size of the room may require that two teachers share a desk. In the classroom-equivalent spaces there should also be desks from which the teachers operate. The workroom should be capable of holding at least one table on which papers and materials can be spread out (as, for example, when a bulletin board display is being planned). A small mounted chalkboard and a tackboard of perhaps 8' x 4' dimensions should be provided.

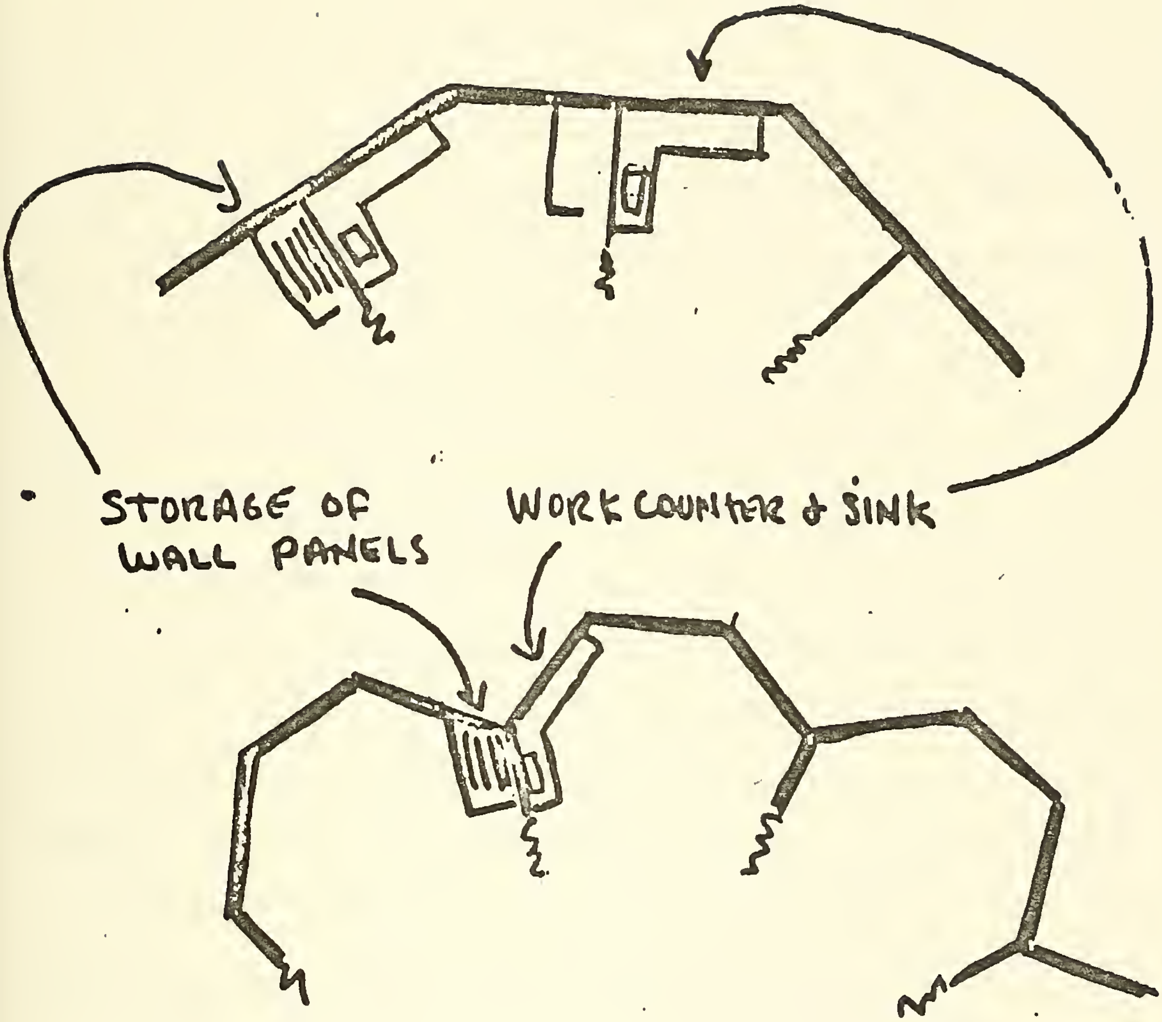


FIGURE "VIII"

(Not to Scale)

About fifteen adults, plus probably a teacher aide in years to come, may be expected to require work space of this sort in each house serving two teams of children. Depending upon how the floor plan works out, it would be very desirable for the teachers of both teams to share a single work area. This would facilitate inter-team communication and give the staff a greater feeling of unity.

There should also be a work counter with sink and hot and cold water, place for a typewriter on a typewriter stand, bookcase having shelf space equivalent to approximately 30 linear feet, a filing cabinet for each teacher on the staff of the house (preferable a two-drawer filing cabinet) a duplicator, a photocopier, and a screen. The dimensions of the workroom should be such that it is convenient to preview film and filmstrips. Such other equipment as tape recorders, moving picture projectors, television receivers, filmstrip and slide projectors, overhead projectors, etc., presumably will be available from the equipment storage facilities of the house.

The Project Area: Facilities for Creative Activities

Numerous references have been made to the needs of the elementary age children for exploratory and creative experiences for working with a great variety of materials and for building, assembling, examining, repairing, rearranging, and otherwise manipulating the objects through which so much of this learning takes place. In many schools these things happen all too seldom, usually because there is not suitable provision of space and equipment for noisy, messy, practical activities. In some schools there is available an arts room, perhaps also an industrial-arts and crafts room, and in quite a few others there is appended to the regular classroom a workshop-type space.

We suggest that there be on each floor a "Project Area" in which three important activities can be carried on. Since it serves many class groups, it

should be of sufficient size to permit a variety of simultaneous activities.

In some of the preceding sections it has been suggested that interest centers might be established in the project area for social studies, for art (see the detailed information provided about work space, special storage requirements, equipment, two kilns, etc.), and for practical arts (again) specific details have already been provided). Since many of the potential functions and equipment requirements overlap, the consolidation of all project space into one area, mutually convenient to the two teams that will share it, would seem to represent a very good investment.

It is important to note, as well, that the project area is one of the places where children can, in terms of their own values, establish friendships and working relationships with children from outside their own classroom or cluster. Too, it represents a place where there will be more opportunities for learning how to function independently than in the usual classroom.

The Shape of the Spaces

In considering the problem of achieving the proper association of spaces, it has been proposed that the total space on each floor should perhaps take the shape of some sort of polygon other than a rectangle, which may be regular or irregular in shape, and presumably having a convex envelope or outer wall. Figure VIII reflected this idea in part. It is the convex perimeter of the total space that allows the classroom equivalents (which are bounded partly by fixed walls and partly by operable walls) to relate as they do to the mitre-shaped "Common Learnings Area".

In Figure IX, which is adapted from the plan of the Granada Community School in Reed Union School District (Marin County), California, is shown another way that classrooms can be clustered. When this school was built,

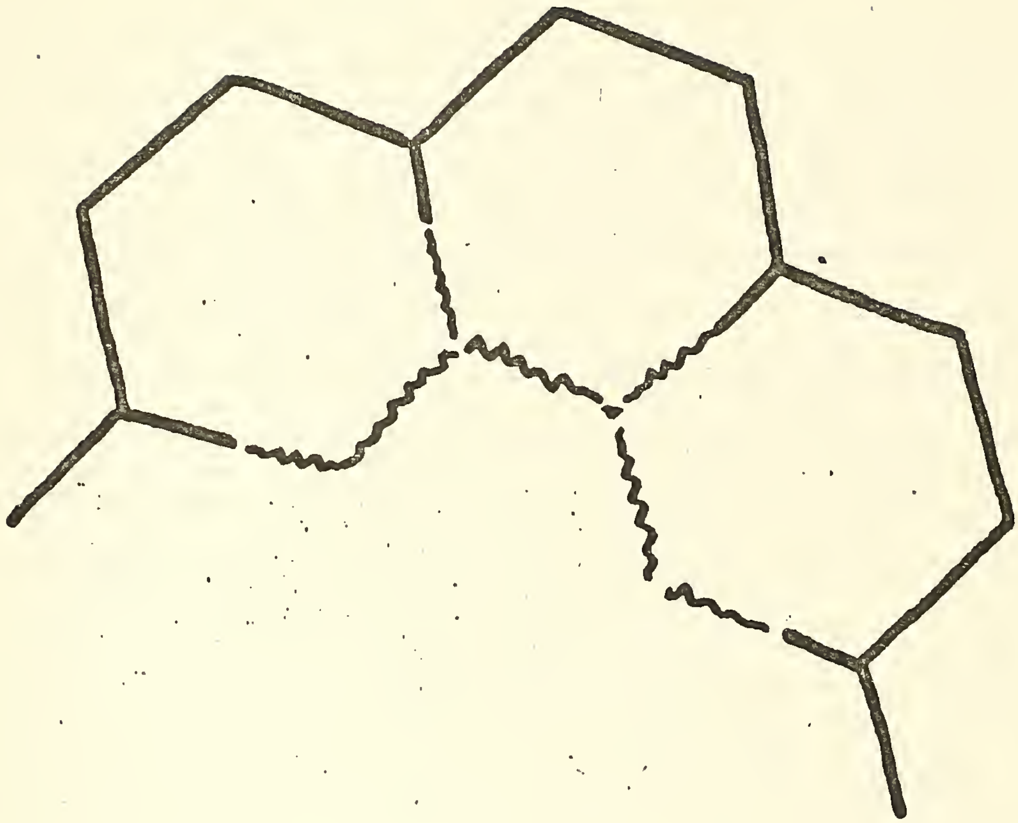


FIGURE "IX"

HEXAGONAL CLASS SPACES

by the way, the interior walls were eliminated altogether. In our Figure, the hexagon is the geometric model for the classroom-equivalent space with a larger portion of each space bounded by fixed walls and with the individual hexagons so arranged that the exterior envelope, while convex, nevertheless is a succession of half-hexagons.

It is already clear from these examples that there is no particular shape that is the only one that can be used for instructional spaces in the cluster-type arrangement. For example, in Figure X, it is shown that a number of rectangles, typical of the traditional classroom but with operable walls for everything except the outside envelope, can function in a cluster-type arrangement.* The essential thing seems to be that the rooms or spaces have a common interior focal point and that the exterior wall or envelope can be roughly concave when viewed from the interior (and of course convex when viewed from the outside).

Figure XI shows an octagonal envelope, with the perimeter of the octagon and stub walls located at the centers of the sides dilineating the classroom-equivalent spaces and allows for a common learnings area in the interior, and, if the octagon is not completed, an open side upon which the library, offices, teachers' workrooms, special instructional spaces, etc., can be located. One other example, Figure XII, shows an adaptation of the envelope used in the Louisiana Schnell Elementary School, Placerville, California. None of our figures have been drawn to scale, and they are offered here primarily to substantiate the argument that a good plan which allows for the creation of a functional team as recommended, is quite possible of attainment.

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* Figure X is adapted from the plan of Crescent Elementary School, Crystal Union School District, California. It is a five-classroom cluster, but the shaded classroom (6) shows how the concept could be adapted to a six-teacher plan.

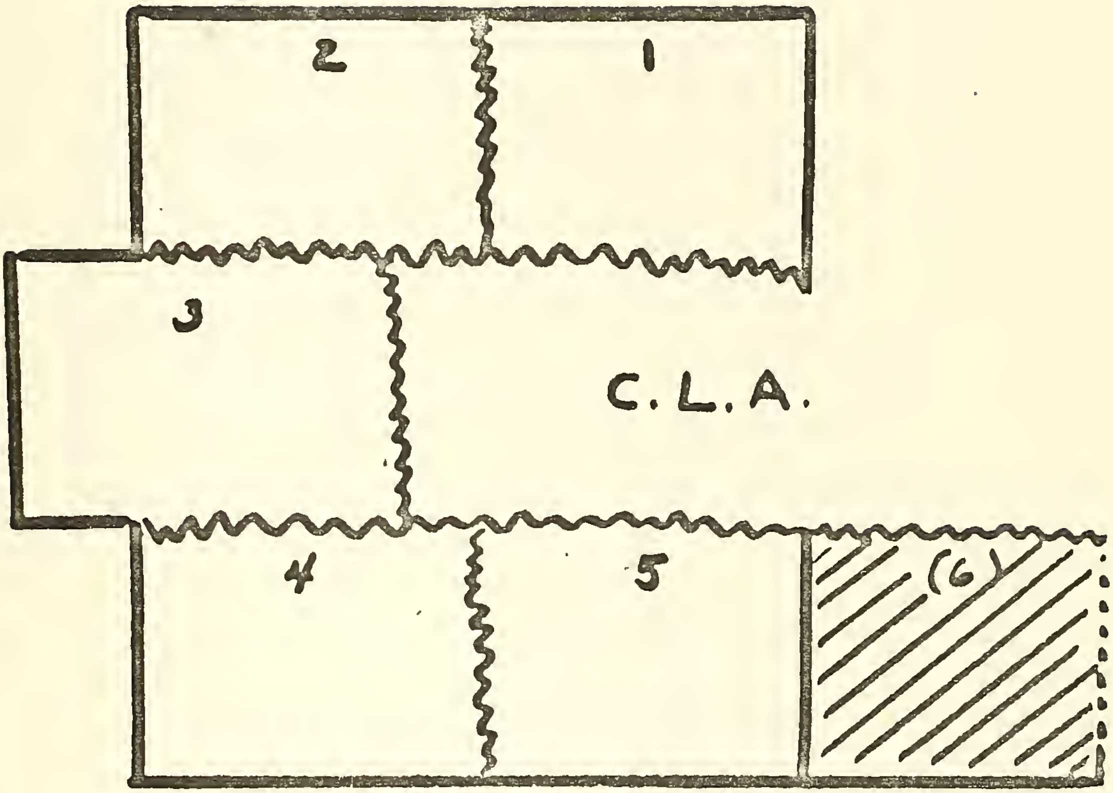

FIGURE "X"

RECTANGULAR CLASS SPACES

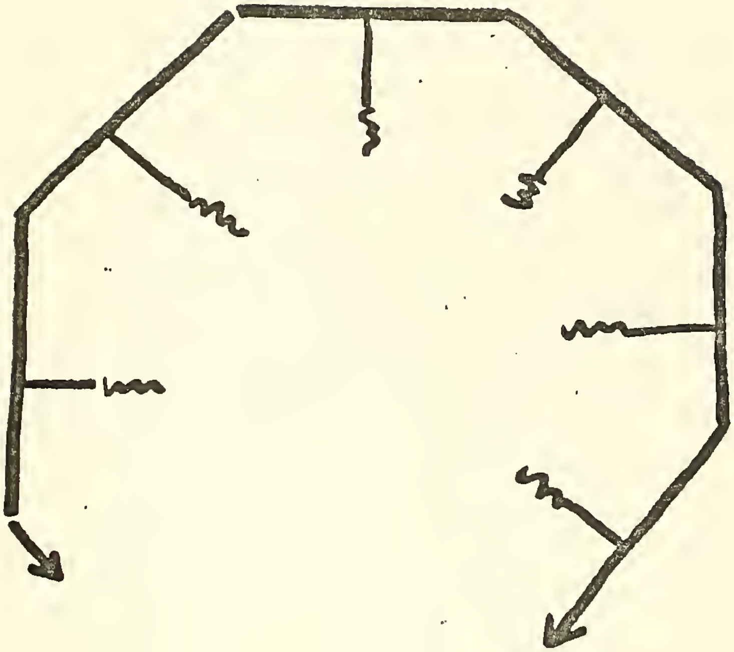

FIGURE "XI"

AN OCTAGONAL ENVELOPE

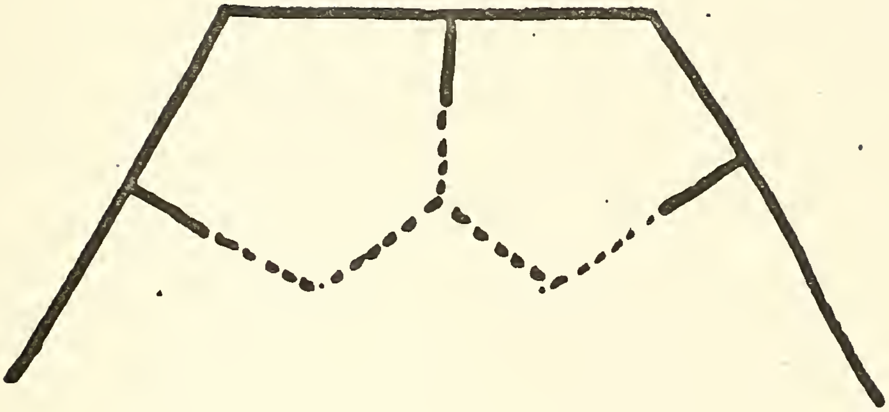

FIGURE "XII"

Finally, a comment may be in order about movable walls. This school will have a very large number of such walls, and they are important to the entire concept of these schools. The perfect movable or disappearing wall or so-called operable partition has not yet been invented. But various types of wall panels that slide in ceiling grooves or can be moved from place to place on tracks of one sort or another are available. These, with a small amount of fixed partition* and the use of storage cabinets as space dividers, permit a great deal of flexibility in the subdivision of total space. One thing is necessary, however, and that is that all of these things must operate easily, without any great physical effort on the part of the teacher. Any wall dividers that require substantial time for their movement, or are difficult for a teacher, especially a woman teacher, to operate, or which require the services of other people, will not be given full use. The operation must be as simple as pulling a drapery across a window.

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* These may be stub walls, possibly eight to ten feet in length, extending from the outside wall to the interior of the house space.

SERVICES

The preceding discussion has covered all of the spaces set aside for direct instruction in the various subject fields which are a part of the program of the elementary school. It is necessary now to give consideration to a number of spaces where what might be called service functions will be carried out.

Administrative Suite

The administrative suite houses the facilities and personnel necessary for the management of the school and the consideration of pupil problems. Because of the many functions this area must serve, the administrative suite has several specialized space requirements. The spaces which are necessary include an office for the principal, an office for the assistant principal, a conference room, a reception area, a clerical workroom, a storage room, lounge, and rest room area, and several small offices for special personnel, such as guidance workers. All these areas should be sound proof. The administrative suite, including such conference rooms and additional offices as will be needed for expanded school programs, should be located with an entrance easily found and used by the public. Because the administrative suite is often the public's first impression of the school, every attempt should be made to create within it a warm, friendly and open environment utilizing such amenities as carpeted floors, paneled walls, brightly colored equipment and furnishings, and good lighting. Since persons will on occasion work on nights and weekends in the office area, this entire area should be provided with separate thermostatic control of temperature.

Principal's Office

The principal's office should have a floor area of from 200 to 240 square feet and be located to permit easy access from the reception area. There should also be a second exit into a convenient corridor or lobby

space. This room should be carpeted, provided with adequate lighting, and have an adjacent lockable closet. To permit utmost flexibility of room arrangement and utilization, at least four electrical outlets should be provided in this office.

The principal's office should be equipped to conform to the dignity and importance of the principal's position. There should be an executive-type desk, a matching table, suitable matching chairs for visitors, a lockable filing cabinet which matches the desk and table, a matching bookcase, and a telephone stand. There should also be a microphone as an origination point for an intercommunication system, and two telephones, one for internal use and one with a listed school number.

Assistant Principal's Office

The office for the Assistant Principal should have about 150 square feet of floor space and be equipped in the same manner as the office of the principal. The area should be carpeted, providing the same lighting and electrical facilities as the principal's office, and have an adjacent lockable closet. The room should contain an executive-type desk and chair, four visitor's chairs, table, bookcase, telephone stand, and a lockable filing cabinet. The telephone should be an extension of the school telephone line.

Conference Room

The conference room, which can be used by the school and community people for small group meetings, should have a floor area of 300 square feet. Ideally, the conference room should be located between the principal's office and the assistant principal's office, with the conference room directly available from each office, as well as from a corridor or convenient part of the lobby. If this arrangement is not possible, the conference room should at least be located adjacent to the principal's office.

The conference room should have a large conference table and twelve comfortable chairs. There should be a small side table and a bookcase. The room should have a mounted chalkboard, presumably about six feet by four feet, and a mounted tackboard of the same size. There should also be a screen (or equivalent) mounted on the wall or ceiling for films, slides, and overhead projector use. In addition, the conference room should be wired for the reception of closed and open circuit television programming, as well as providing at least four electrical outlets. A costumer or adjacent closet should be provided for accommodating the outdoor clothing of those who come to the conference from outside the building.

Reception Area

The reception area of the administrative suite should have a floor area of approximately 300 square feet and be located directly off the main lobby so that it is immediately available to parents and other visitors. To insure a warm, friendly arrangement, the reception area should be carpeted and furnished with comfortable lounge-type furniture. This area should provide a desk (with typing "L") and chair for a receptionist-clerk, who will answer the telephone and do other light clerical work. Appropriate use of

attractive wall hangings and potted plants should also be included in this area. Because of the large number of visitors, we presume this school will have, it is recommended that a portion of the lobby area be furnished comparably so that it might seem as an extension of the reception area. In addition, the lobby will serve as a display area for student and community projects and equipment.

Clerical Workroom

The clerical workroom should have about 400 square feet of floor area and be easily available to pupils and teachers. This area, in which most of the office work will take place, will be separated from the reception area by a partition. With this arrangement, it is presumed that there will be at least two clerks or secretaries on duty, one to act as receptionist-clerk and and one to be in the workroom handling mail, typing, duplicating materials, mimeographing, and the like. This area should contain provisions for at least three desks (each with typing "L", typewriter and telephone on school line) and chairs, counters, a table for collating materials, and lockable file cabinets as well as space for the mimeograph, duplicator, and photo-copy machines. A cabinet, with built-in sink and counter facilities, four current work storage and clean-up activities should be installed along one wall.

The clerical workroom will serve as the repository for the intercom system console, as well as housing facilities needed for an internal telephone system. Because of its central location and easy accessibility to staff, this area should contain a built-in, 40 unit mailbox (each large enough to handle 10" x 14" x 6" packages) and a tackboard for notices and posters of general interest to the teaching staff. The mailbox should be installed

in a wall so that access will be from the corridor or lobby while the boxes may be stuffed from inside the clerical workroom. It is assumed that the clerical work area will be carpeted with the possible exception of the floor areas adjacent to sink and cabinet space.

The clerical work area should have adequate lighting and electrical outlets.

Storage Room

The storage room for the administrative suite should contain 120 - 170 square feet and be located adjacent to the clerical work area. The area, which will accommodate previous records and office supplies, should have at least two walls lined with shelving. In addition, free-standing shelving with wider shelves could be placed in the center of this area. A lockable steel cabinet for flammable materials should be located in the storage room. The school vault also can be located in this area. The vault should be a walk-in type with fire resistant walls. It should be about 8' by 10'. The door should have a combination lock and the door should be one that can be opened from the inside. A composition floor, such as vinyl, would be adequate to serve the purpose of this room.

Lounge and Rest Room Area

For clerical personnel in the administrative suite it is suggested that there be a small lounge area of approximately 120 square feet with adjacent toilet located convenient to the clerical workroom area. A small kitchenette with refrigerator and hot plate and sink should be installed in this facility for the benefit of the clerical personnel as well as serving as a preparation area for refreshments for various school and community meetings held in the conference room and administrator's offices. Also, there should be somewhere

in the administrative suite a toilet for the men who have offices in this area.

Small Office Spaces

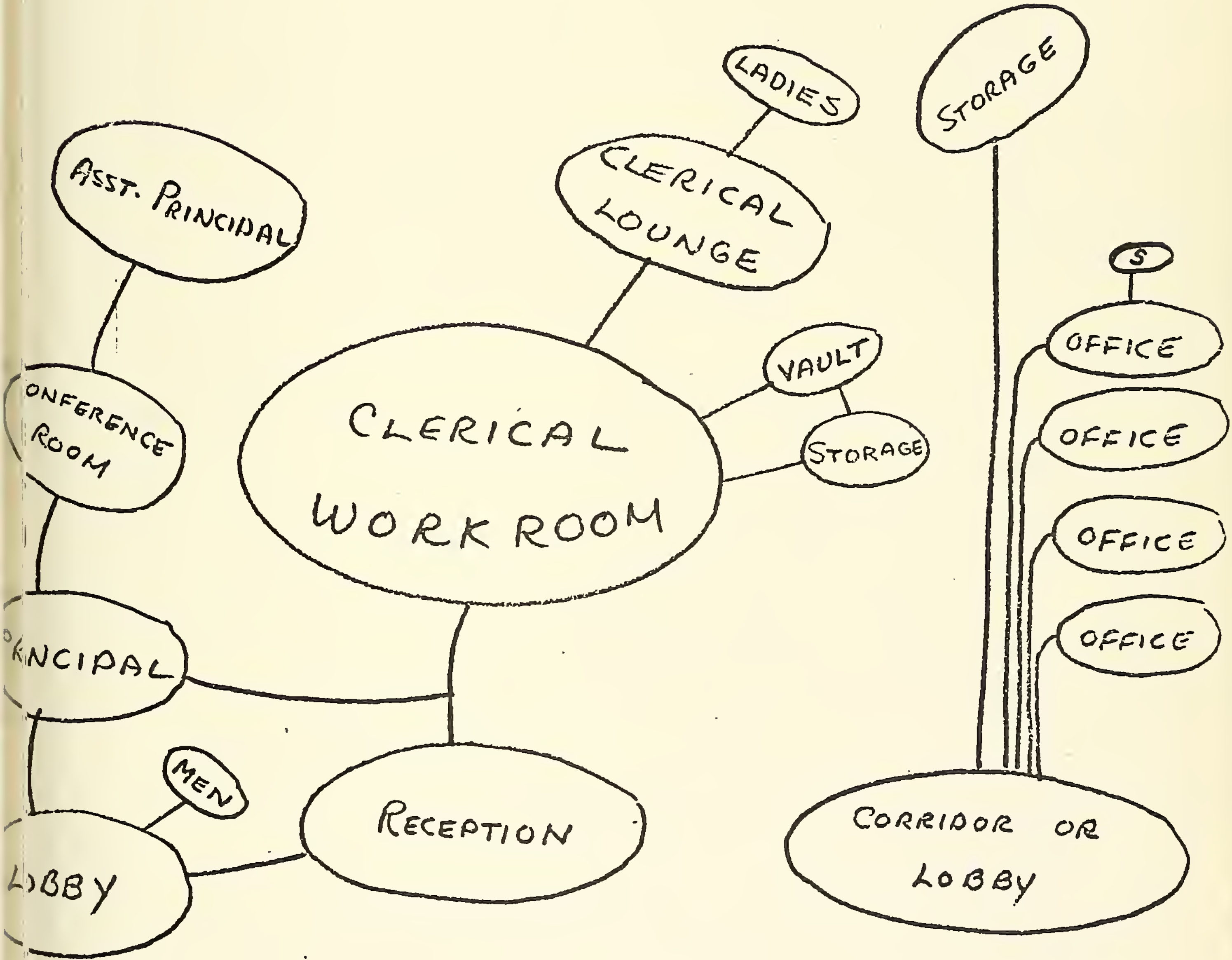
The functions of pupil adjustment and counseling also require office facilities. The people who are involved in this work include a pupil adjustment counselor, an attendance supervisor, a guidance counselor, teachers and parents in conferences and cooperative endeavors, and testers for the department of measurement.

It is recommended that four offices each with a floor area of 150 square feet be included for use by special personnel while they are in the building. Each of these offices should have a telephone, a desk, two chairs, and a lockable file cabinet. The offices are to have doors.

A schematic design of the administrative suite, Figure XIII, can be found on the next page.

FIGURE XIII

SCHEMATIC - ADMINISTRATIVE SUITE



The Health Suite

A. Basic Health Services in the Boston Schools

1. Physical Examinations

In compliance with legal requirements the schools require a physical examination for each child at the following levels: pre-school (either kindergarten or grade one), grade four, grade six, grade nine, and grade eleven. In addition, the school examines students in special classes and those who compete in interscholastic athletics on an annual basis. Each elementary school has a health room; and, whenever possible, these examinations are given in the health room. The examination is administered by a doctor who is assigned to the particular school.

2. Eye Examinations

Examinations for visior are given to each child annually. The work is done by a staff of registered nurses who go from school to school, bringing portable examination equipment with them. The examinations are usually given in a room which is temporarily made available, since in some cases the health room is busy with its regularly assigned programs. However, an examination room should be provided in the health suite for this purpose.

3. Hearing Examinations

These examinations are also given to each child annually and again this work is done by a staff of registered nurses who come from school to school with portable equipment. Again these examinations are often given in a classroom or other space made temporarily available if a special examination room is not provided for in the health suite.

4. Immunization Program

Diphteria and tetanus shots as well as boosters are administered to all children through grade four. Older children may receive booster shots at the school upon parental request. Salk and Sabin vaccines have been administered in the past but no booster has been given recently. This program is given at the discretion of the cooperating doctors and the city health department.

5. Detection of Contagious Diseases

At the present time the elementary schools are served by nurses who travel from school to school. It may be that in the future there will be a full-time nurse in each large elementary school. The nurses, when they visit the schools, interview children who the teachers call to their attention because of suspicion of the incidence of contagious diseases. It is an important function of the teacher to be on the lookout for children who give evidence of symptoms of illness.

6. Dental Program

This program consists largely of referral of pupils with visibal cavaties to city clinics or private practitioners. In the case of children who would qualify as disadvantaged under the elementary and secondary education act, there are Title 1 funds available for sending them to private practitioners for corrective work. However, a dentist who visits the school can treat any children regardless of income. The city pays for this work.

7. Treatment of Cuts, Bruises, Etc.

With young active children involved in activity on the playground, it may be expected that there will be a variety of bruises and cuts which need attention, some of which, of course, may be sufficiently serious to need attention beyond that which can be given in the school health suite. Also, there seem almost always to be some children who are ill, and it is not always possible to arrange for them to be sent home to their parents. Accordingly, it is necessary that there be a place where they may rest and receive attention from the visiting nurse in the school. Without parental consent the school cannot send a sick child home. Consequently, many of them have to stay in the sick bay for fairly lengthy periods.

B. Recommended Facilities for Health Services

To carry out these services, it is necessary that there be a nurse's office located adjacent to the reception area, or waiting room, (with appropriate seating and a mounted bulletin board), where patients may be received. The office should be fitted up with a desk, two chairs, and filing cabinets. There should also be an examining room and this should be a space in addition to the office and the reception room. There should be a set of scales, a waste receiver, a lavatory (with knee control of faucets), an instrument cabinet, an examining table, a couch, and a three-fold screen. There should be also a sick bay space separated into two parts, one for boys and one for girls. It is suggested that for a school of this size there should be two cots in each of these sides.

With the sick bay there should be a toilet for each sex, and the arrangement should be so it will be convenient for a child who is ill and lying on one of the cots to get to the toilet quickly. It is also expected that there will be a dental room which can be fitted up with the usual dental chair and equipment, and that this room will be adjacent to the nurse's office or the examination room. A schematic drawing for the health suite is shown in Figure XIV. Excluding toilets a summary of the space requirements is given below:

Health Office, Reception, and Storage	200 sq. ft.
Examination Room	100. sq. ft.
Cot Rooms (2)	80 sq. ft. (Each)
Dental Room	100 sq. ft.

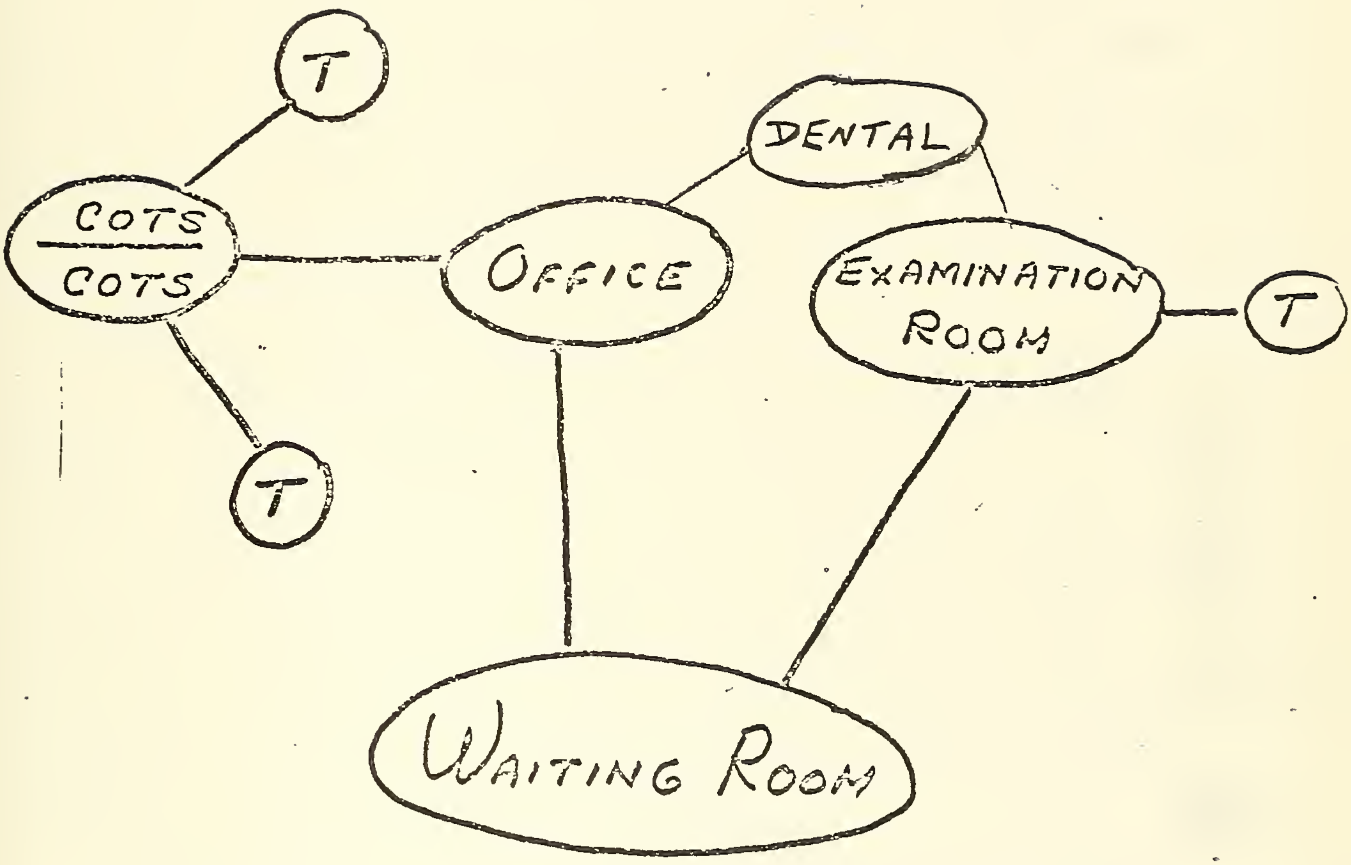


FIGURE XIV

SCHEMATIC SHOWING RELATIONSHIPS IN HEALTH SUITE

Lunch Service Facilities

The essential elements in the school cafeterias or lunchrooms are sufficient space for seating the pupils and a means of providing them with food. For dining, flat floor spaces, which can also be used for assemblies, may be utilized. There is generally no conflict in such use because assemblies are usually not scheduled at noontime. On the other hand, conflicts do arise when gymnasiums and other physical education spaces are scheduled for pupil feeding.

Inasmuch as the kindergarten pupils may not eat lunch in school, there will be approximately 550 children for whom lunch must be provided. Probably, they will be fed in two shifts, and therefore 300 will have to be seated at one time. If the building is provided with a flat-floor cafeteria/auditorium capable of seating 400 pupils on folding chairs for assembly purposes, it may be expected that the lunch room load can be handled through the use of folding tables which can be stored in wall cabinets and in a suitable adjacent storeroom.

A food preparation kitchen will be provided in the building, and it is essential that there be a sufficient number of service lines so that each line will not need to be too long and not too much time will be taken up by the pupils waiting in line. Experience shows that, even with a fixed menu listing choice on the part of the pupil, the serving of one pupil every three seconds may be regarded as maximum speed in service. At this rate it takes five minutes to serve 100 pupils; so for a load of 300, it will be necessary to have three service lines, if the service is to be completed in

five minutes, which is desirable maximum time for this purpose.

For good supervision the lines should be formed in the open dining room space and not required by building design to form in or to traverse narrow chutes or tunnel-like corridors. If the kindergarten pupils do come to eat lunch in school it may be accomplished by three shifts in feeding.

Cafeteria Kitchen

The cafeteria kitchen is a specialized service area usually designed and equipped by specialists. In the state of Massachusetts it is possible to get a considerable amount of assistance in planning from the State Department of Education. The kitchen should have easy access to a delivery dock. Provisions should be made for dry and cold storage, freezer space, garbage can storage and washing, staff locker, wash, and toilet facilities, a manager's office, and facilities for dishwashing, dish storage, and pot washing, in addition to the equipment for preparation, cooking, and serving of food. This kitchen will also prepare food to be served in the nearby Beethoven School building. State advice should be sought.

The cafeteria kitchen must be designed for good acoustics, with all finishes impervious to moisture and easily cleanable, with good ventilation and with a shape that provides a long dimension along the dining room wall to permit the required number of service lines to be installed. There should be as little depth to the kitchen area as possible to provide the shortest convenient carrying distance from storage to preparation to cooking to serving. The floor should be easily cleanable and may well be quarry tile or some equivalent. The best installation is with equipment items made of rust

resistant metals, as for example, stainless steel. Furthermore, for purposes of cleanliness, it is often recommended that the equipment items be set upon raised cove bases, rather than upon supporting legs with open spaces underneath which are hard to keep clean.

The Cafeteria/Auditorium

The cafeteria/auditorium should be large enough to seat 400 people in removable folding chairs and will have folding tables and benches sufficient to seat about 300 students at lunch. Along one wall, probably best at the rear wall, there will be cafeteria serving facilities. The folding lunchroom tables will generally be housed in wall cabinets along the two sides of the room, although if there is not enough wall space, some of them will be housed in a storeroom off the main seating space. There will also be a storeroom off the main seating space for housing the folding chairs on chair trucks.

This room's stage should also be high enough so there will be reasonably good lines of sight from the people seated in the rear of the flat floor. It should be about 500-600 square feet and should be so arranged that it can be separated from the seating space by an operable partition electrically operated. It should, also, have storerooms on each side of the stage. These storerooms should not take up wing space of the stage. The stage should extend practically the full width of the seating space with the storerooms provided either to the rear or to the sides beyond this space. Again, the stage rigging does not need to be complicated. The stage may be dimensioned with the greatest depth that the public safety department will consider acceptable as a platform.

Teachers' Lounges and Other Staff Facilities

It is desirable that there be spaces where teachers may rest and where they may eat lunch and gather together for casual discussion and relaxation. It is expected that there will be teachers' toilet facilities on each floor. Accordingly, it is not necessary to have a complete lounge facility on each floor. The teachers' lounge space and dining room space may well be combined, and accordingly it would be advantageous to locate such space adjacent to a kitchen.

For a school of this size it is reasonable to expect that there will be more than 30 staff people; although it cannot be foretold whether or not they will all spend their lunch hour at school. However, assuming that good food is available, and that comfortable and convenient arrangements are made for the staff to eat at the school, it may well be expected that the majority of them will take advantage of this opportunity. Not all teachers will be able to eat at the same time. Accordingly, it seems necessary to provide a space large enough so that part of it can serve as a dining room with tables for about 20 people.

In addition to, or preferably as a part of this area, there should be a "living room" section with a divan or two, some easy chairs, one or two coffee tables, floor lamps and other conveniences arranged in an attractive manner for rest and social conversation and relaxation. With good planning, this dining-lounge area could serve as a place for total-staff meetings, for staff teas or social activities, for university and other visitors to mingle and confer with teachers, and so forth.

There will, of course, be both men and women taking advantage of this

accommodation. The tendency today is to provide one space for use by both men and women. However, since it is also necessary to provide some privacy for each sex and to provide toilet facilities for each sex, the complete suite will consist of the main dining-and-lounge area with smaller private lounges for each sex opening off this main space. Then it is possible to have the toilets for each sex off the private lounges. If the entire suite is carefully arranged, there will be no embarrassment for either sex inasmuch as the private lounges intervene between the main lounge and the toilet facilities.

It is recommended that there be a kitchenette unit consisting of sink, small refrigerator, and small range, plus cupboard facilities, installed in the faculty lounge.

The following room areas are suggested:

1.	Dining area	500 square feet
2.	Faculty general room	400 square feet
3.	Women's private lounge	200 square feet
4.	Men's private lounge	200 square feet

A schematic drawing of the interrelationships in this facility is shown in Figure XV, on the following page.

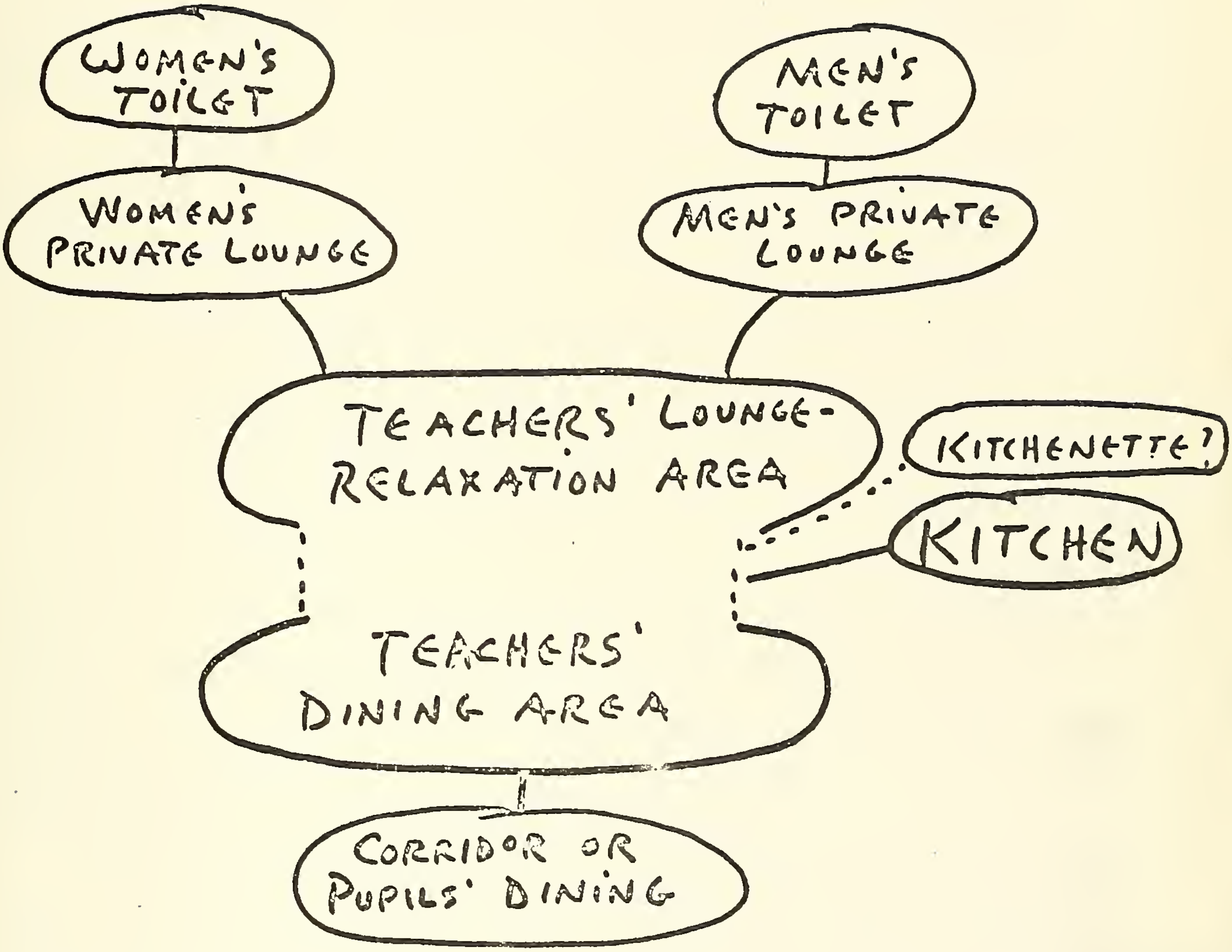


FIGURE "XV"

RELATIONSHIPS IN TEACHERS' DINING-LOUNGE AREA

Toilet Rooms

In various places in the building it is necessary to install toilet facilities for the pupils, for the school staff, and for use by the public. In some cases the same set of toilets can be used by more than one of these groups. Reference has already been made to several specific toilet requirements.

It has been recommended that the rooms which will be used for kindergarten and pre-kindergarten children will be arranged in pairs with an operable partition between them. Each room, or pair of rooms, should have a set of toilets. It is suggested that for each 25 kindergarten children there be two spaces in each of which there will be a seat and a washbowl. In keeping with the desire to provide a home bathroom as far as possible, if the door to these rooms is arranged so that the entrance is not subject to direct view from the rest of the classroom space, there need not be an inner compartment. It is also suggested that the washbowl be set in a plastic surfaced counter, that mixing faucets be installed, and that there be a mirror over the counter. There should be a paper towel cabinet and soap dispenser conveniently located.

Throughout the rest of the school where toilets are installed for use by the pupils, the fixtures, counter heights, etc., should be sized in accordance with the age level of the groups for which they are designed.

In the classroom areas above kindergarten, it is recommended that gang toilets be installed. The number of toilet fixtures should be determined in accordance with the Massachusetts Department of Public Safety code.

On the ground floor, there should be a set of toilets so arranged that they can be entered from the outside by children using the playground. These toilets should be inaccessible from the interior of the building.

Since these toilets will sometimes be used by children older than those enrolled in the school, the fixtures should be of adult dimensions or close to them.

It has already been indicated that there will be toilet rooms adjoining the teacher's lounge and the office suite. In addition to these, there should be toilet rooms for men and women teachers on each floor.

There are certain features relating to toilet rooms which merit discussion. In the first place, all of the materials in a toilet room should be inorganic, or at least resistant to absorption of moisture. Because of the presence of many hard surfaces, it is desirable to have the rooms acoustically treated. Floors should presumably be of tile or terrazzo. Plumbing fixtures should be strong, well anchored, and corrosion-proof. Soap dispensers and similar fixtures should not be mounted with screws to wood, lead or plastic shielded holes, but should be securely bolted in place. All surfaces that can be reached by pupils and, in the case of adult toilets, by adults, should of materials resistant to scratching and marking.

Custodial Facilities

Generally the headquarters for the custodial staff is located adjacent to the receiving room and to the space housing the heating plant. The receiving room usually becomes a storage space for various types of building supplies, including cartons of toilet paper, paper towels, cleaning rags, containers of wax, cleaning fluids, etc. It is desirable that there be a loading dock just outside the receiving room and a large door as the entrance from the outside. In multi-story buildings such as this elementary school will be, it is desirable that the receiving room be reasonably adjacent to an elevator. The headquarters for the custodial staff should provide space for a desk and files and a work bench and tool cabinet. There should also be a small locker room with an adjacent toilet, shower and lavatory.

At various points throughout the building there should be custodians' work

closets where the vacuum cleaners, brooms, brushes, and other cleaning instruments can be stored. Each of these spaces should have a sink with hot and cold running water, and inasmuch as these sinks are generally used to fill or empty pails of water, it is recommended that the sinks be floor-type sinks. There should also be in each of these work closets shelf space for storing paper towels, toilet paper, cleaning rags, light bulbs, etc., for immediate use in the area. It is generally advisable to have one of these closets for every ten to fifteen thousand square feet of floor space. Obviously there are certain spaces that must have the convenience of these work closets. One of these of course is the gymnasium; another is the cafeteria-auditorium.

Storage and Logistic Facilities

It has been a common complaint by those who use school buildings that there has never been enough consideration paid to the installation of sufficient storage space. For the average classroom the materials that need to be stored are, of course, such items as books, paper, pencils, chalk, chalkboard, erasers, paints, crayons, and an almost endless variety of other school supplies; equipment in the nature of radios, record players, moving picture machines, film and slide projectors, overhead projectors, opaque projectors, and the film strips, slides, records and tapes that are used with them. It is also necessary to have space to store pupil projects either in the finished or unfinished stage. Various types of special spaces (for example, a space devoted to instruction in art, or science, or practical arts) will need storage for materials which are peculiar to those areas. For example, it has already been indicated that the storage for arts supplies must be designed so that it can take large sheets of paper and such special materials as clay.

The storage of pupil's clothing will be covered in a special section later one, but it is necessary to provide convenient arrangements for teachers and

staff to store their clothing. In this particular school, it is not expected that teachers will rely upon a teacher's closet for storing their clothing as they would in the traditional situation. Nevertheless, it is well to have closets of the traditional type located in the fixed partition portion of the classroom equivalent. However, in addition to this there should be space in the teacher's planning area for wardrobes or lockers and there should also be space for these in the teacher's lounge area.

A good deal of the storage of classroom supplies and books may be cared for by movable storage cabinets which in turn can serve as space dividers. There are a number of types of these items and, if necessary, they can be custom designed.

Earlier in this document it was suggested that, with the stress upon flexibility and the use of operable partitions, there will not be as much permanent corridor space as has been found in the traditional schools. Nevertheless, there must be means of getting from floor to floor and this can be accomplished not only by stairways but possibly by ramps and certainly by elevator. The elevator should be suitable not only for passengers but also for the moving of equipment and materials. It is suggested that there be at least one elevator.

Traffic Within the Building

Children using the first floor, and presumably staying on that floor most of the time, will have direct entrance to the school from the street and playground. It is expected that the kindergarten children will have a playground area restricted to their use, and that it can be reached directly from the kindergarten section without traveling to

other parts of the building. To simplify the problems of entrance and exit to the upper floor, it is suggested that consideration be given to providing them with separate stairways (or combinations of ramps and stairways). These can be located adjacent to one another with passage from one to another on landings in such a way that pupils using a particular stairway will go to the level where they are housed and also that the staff people may cross from one stairway to another at any landing in order to go from floor to floor as may be necessary in their work.

Parking Facilities

While not all of the staff of this school may drive to work, nevertheless, it may be expected that a considerable number of automobiles will be involved. An estimate of the number of teachers in the building, the clerical staff, the administrative staff, and those connected with the Boston schools who travel from school to school and will be needing parking facilities when they come to this school, leads to a count of about 40 automobiles. In view of municipal parking problems of the present day the trend is toward the provision of off-street parking.

Accordingly, a surface parking area near the school building for 40 automobiles should be provided. In addition, immediately adjacent to the main entrance of the building, parking space for approximately six visitors' automobiles should also be planned.

One rather special request is that provision be made for the convenient parking of one school bus which, it will be recommended to the School Department, should be permanently assigned for the school day (including the after-school program and perhaps the evening program) to the school. This bus will play the role of a "family car". Constant access to a bus would greatly

facilitate field trips, exchanges of services with other schools, and other activities that help to extend the walls of the school.

An additional suggestions is that this bus be equipped, for use on field trips, with an internal loud speaker system and possibly even with educational tapes and invividual earphones for each passenger.

This bus will be especially useful in the implementation of the natural science program of the Georgetown School. Not only could the bus be used to transport the pupils of this school to such areas as the Blue Hills (with its Trailside Museum), but it could also be used to transport the pupils of nearby elementary schools to the Georgetown School where they could share the offerings of the natural science program.

Educational Television Facilities

The use of television in instruction has been a field of endeavor in which a great deal of progress has been made in recent years. Large sums of local, state, federal, and foundation money have been spent in developing adaptations of television procedures to serve schools. These endeavors have ranged from the establishment of networks of educational television stations, supported in part or in whole by public funds, to the use of airplanes as broadcasting studios. Some school systems have developed closed circuit systems with central studios linked to the various schools by leased wires, coaxial cables or microwave installations. In other cases individual school buildings have studios installed with television sets available in the classrooms and in carrels in the library reading rooms.

The television screen is an excellent instructional device. It is superior to the moving picture screen because the space where it is seen does not have to be darkened completely and, furthermore, in any viewing space there can be more than one television screen installed. Hence, the sight line arrangement can be comfortable and convenient. In addition to this the television voice reproduction is generally better than that from a moving picture apparatus and there is no distracting noise from the mechanism.

There are five general types of use of television programs, namely:

(1) The reception and presentation to pupils of broadcast programs as from WGBH. These programs can be carried either on VHF or UHF.

(2) Programs which have local origination within a studio in the school. This can be within the school building or within the school system. These programs will be live programs carried on the closed circuit communication system.

(3) Programs originating in the school studio or school system studio from motion picture films by the use of a film chain camera.

(4) Programs originating in the school studio or the school system studio from video taping of broadcast programs or video taping of local live programs. This use of video tape makes it possible to present the program over and over again in reruns at times which are most convenient to the instructional staff and the pupils.

(5) Programs originating in the school studio or the school system studio from commercial video tapes which are kept on file for instruction in various subjects.

In an elementary school it is usually possible to use broadcast programs to good effect. The only problem is that the number of these programs coming over the air at one time is limited to the number of educational television stations which are within broadcast range of the school. In most cases there will be only one such station. This sets an arbitrary limit upon the number of television programs which can be used in any school at any one time. In secondary schools broadcast programs are of little value because of the multiplicity of class sections in many of the subject courses. In elementary schools the schedules are not so definitely organized and any teacher or group of teachers can arrange for the pupils with whom they are working to receive a broadcast program at the time it is available.

Both for elementary and secondary schools, however, there seems to be a new type of television use emerging. This is due to the development of low cost video tape recorders. It is now possible for a school system or

even an individual school to have in its television studio or technical space more than one video tape recorder. If in addition the school or school system will develop, either from the receipt of broadcast programs on the tape recorders or through the commercial or state school system distribution of suitable instructional tapes, a library of these tapes for instructional purposes, a proper switching system will permit the use of several programs at one time within the school building.

Wiring Requirements

Within this elementary school, it cannot be expected that live programs will be originated and presented. However, this school should be wired to receive broadcasts from commercial and/or educational television stations as well as closed circuit programming originating from the school system's central studios. Adequately to receive commercial broadcasts,the school should be equipped with a master antenna on the roof. Closed circuit programming will be received by wire or cables from the central studios.

Outlets which would receive jacks from the receiver for both direct and closed circuit reception should be placed in the following locations:

Location	Number Required
Classroom Equivalent Areas (each)	1
Common Learnings Areas (each)	3 (in floor, if wall not available or convenient)
IMC	2
Teacher Planning Areas (each)	1
Cafe/Auditorium	3
Principal's Office	1
Assistant Principal's Office	1
Teachers Lounge	1
Science Rooms (each)	1
Art Project Rooms (each)	1
Reception Area	1
Reading Laboratories (each)	1
Conference Room	1

Television Receivers

To receive television programming, this school should be furnished with fifteen 23" color television receivers. Each set should be on a 5' high cast that can be rolled easily from place to place. The top of each cast should be pitched so that the receiver will sit at an angle to facilitate easy viewing for the students. The television receivers should be displayed throughout the school as follows:

Location	Number in Each	
Team Clusters	3	(9)
Advanced Rooms & Special Rooms	2	(2)
Science Rooms	1	(1)
Kindergarten Cluster	1	(1)
Extra - to be used as supplemental sets in any part of the building		(2)
		15

Portable Video-Tape System

The school should be initially equipped with one portable video-tape system. This system, which can be purchased for about $2,000, contains a television camera, a video monitor, and the tape recording mechanism (audio and video are recorded on the same tape simultaneously) in a rolling cabinet. A portable video-tape system may be taken into the classroom or any other part of the school for taping lessons and demonstrations. It is especially applicable to dramatics, music, physical education, language arts activities, and laboratory demonstrations. The easily erasable tapes enable teachers or students to see or hear themselves in action, correct mistakes, and improve performances. In addition to its use in the classroom, the video tape system can also record direct broadcasts from commercial stations.

Since it has no special lighting requirements, it is easily moved and has very simple controls, the portable video-tape system can easily be mastered and used by the classroom teacher. In fact, a mature elementary student could do the camera work after the system was set up in the classroom. We would recommend, however, that a teacher aide be responsible for operating the system as well as playing back the tapes to classrooms or groups desiring them.

Video tapes may be played back immediately after recording or be stored and shown at a latter date (indeed, like an audio tape, they may be played over and over again). They may be played back for one group on the video monitor or on an individual television receiver (the receiver must have an adapter to accommodate the playing of individual tapes). The portable video tape system may be plugged into a central terminal in the building's closed circuit wiring and serve several receivers at once. The supplier of the system could indicate whether or not an amplifier would be needed if more than a few sets are to be served at one time.

Television-Technological Center

There should be a room of approximately 400 square feet in the building to serve as a television-technological center. This room may be windowless and located in the interior of the building. The walls may be either plaster or painted concrete blocks. The ceiling should be acoustically treated; the floor may be of composition tile. If the room is not directly accessible to the roof, it should be connected to the roof by a narrow shaft or pipe to allow for cables and antennae wires. Because of the nature of the room's utilization, there should be two duplex electric outlets on each wall.

This area will be used for installation and storage of television equipment. Shelving and other storage spaces should be provided to accommodate completed tapes, commercially produced tapes, and other materials. When not in use, the portable video-tape systems will be stored here. Jacks which will accommodate the output of the video-tape system over the school's closed circuit should be in this room as well as na amplifier if needed. Since we are presuming that closed circuit production areas will be centrally located elsewhere in the system, we are recommending no further television equipment for the school. However, if it is eventually decided to include other equipment such as consoles, switches, or additional video tape machines, they should be located in this area.

If a central audio-tape deck is ever included in the school for use with electronic carrels and/or listening centers, it could also be located in this room.

Programming Potential

Presuming that the facilities specified above are provided in the school and the Boston Schools develop a closed circuit educational television system, the teachers in the new school will have at their disposal for instructional purposes the following types of television programming.

1. Direct broadcasts from commercial stations (current events, educational programs, etc.)
2. Live programs over Boston School's closed circuit system (demonstrations, lessons, cultural events)
3. Video tapes
    a. commercially prepared
    b. prepared at school system's central studio

c. prepared in individual school (using portable video-tape system)

d. recorded from direct broadcasts of commercial or educational stations.

4. Films shown over Boston School's closed circuit system.

WGBH

It is recommended that the Boston Public Schools pursue with the educational station WGBH the possibility of sharing studio and equipment facilities to begin production of line and taped television programming for the schools until such time as the Boston Public Schools own and operate their own facility.

VII. FACILITIES FOR THE COMMUNITY SCHOOL

A generation or so ago, a school building would be locked at the end of a school day and not opened until the beginning of school the next day unless for an evening school program, a parent-teachers meeting, or some happening of a special or emergency nature. City schools with fenced-in sites usually had the gates locked even in the summer months.

Hopefully no such policy will exist in this school. Some of the community functions which can be served are:

1. Meetings of groups for many purposes, social, civic, dramatic, musical, etc.
2. After-school and summer educational activities, ranging from "head start" programs to adult educational programs.
3. Health and welfare services.
4. Guidance and information services.
5. Recreational activities for elementary children, teenagers, and adults, including senior citizens.

Most of the community-use recommendations can be put into effect by a policy of dual use, whereby school facilities are used by the children during daytime hours on school days and are used by community groups during after-school hours, evenings, weekends, summerperiods, and so forth. In the following paragraphs, the spaces specifically suited to dual use are indicated.

For large meetings, this building will have a cafeteria/auditorium. This facility will have a stage and toilet facilities, and a small kitchen will be conveniently accessible. For smaller meetings, of course, the possibilities are almost unlimited.

For educational activities in after-school hours and during the summer months, it is expected that the classroom-equivalent spaces can be used. Since the furniture for elementary children is too small for adults, it is expected that some of the folding chairs from the assembly areas can be used. Presumably a reasonable quota of folding tables of adult size should be included in the equipment lists.

For guidance and information the office suite and the assembly spaces should meet all needs.

The potential of community access to a reading center is unlimited. Adults are often highly motivated to overcome handicaps produced, often, by inadequate understanding on the part of others and personal early reticence to take on the challenge to acquire reading skills. In society there continue to be surprising examples of adults who may have some success in the working world but are functionally illiterate. Given the opportunity to have a second try at the problem of learning to read, and some community guidance and encouragement in this regard, great new vistas could open up for some.

Again, adaptation of the reading facilities of the school for adult use would not appear to be a problem. Folding chairs, and perhaps two or three tables, would suffice. Adequate storage is necessary for the small amount of special materials needed. The room should be near other facilities to be used by the community.

Summer programs such as "Head Start" could easily be accommodated in the Lower House, as could a variety of recreational programs for younger children. For these and older children, as well as adults, the other houses are similarly versatile.

Ordinarily, an elementary school would not be provided with gymnasium facilities of the sort these schools will have. However, in this case the gymnasium has been planned primarily with the community need in mind. The playground should also meet a pressing need.

It is important for the community component to have its own identity, however, and space should be available which is more or less exclusively given to community functions. Several recommendations are therefore made to achieve this purpose. One is the provision, in a convenient location for community access, of an office for the director of community programs. The room as specified would in fact be capable of holding several desks if desired.

A second recommendation grows out of our realization that community use of the school might over time involve groups and activities not now clearly envisaged. Accordingly it is recommended that a special "community room", easily accessible to the public, be added to the facilities of the building.* It should be about 2400 square feet in area and should be located close to the gymnasium. It will have no initial use connected with the elementary school program, but may well have value as a small games room, a place for community meetings while school is in session, or a place for senior citizens.

Along with this community room and the office mentioned above, there should be included a storage room having several lockable storage bays

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* (See section Facilities for Physical Education)

available for such groups as the boy scouts.

Perhaps the most difficult problem posed by the community-use requests is the economical provision of space for the day care of young children. Whereas most things needed for community use can be linked (through dual use) to spaces that are also required for the regular pupil program, a day care center would necessarily be additive. No such special addition is recommended. It is hoped that there is enough flexibility in this building so that day care service of a sort can in fact be provided by modifying other services within the community area.

VIII. PHYSICAL AND ENVIRONMENTAL FEATURES OF THE BUILDING

The preceding discussion has been generally concerned with a listing of the facilities which should be included in the building and on the site, their approximate sizes, and their interrelationships. It is understood that the actual design of the structure, the engineering concerned with the way in which it is built, and the choice of materials are all prerogatives of the architect. Nevertheless, in terms of function, it is reasonable to indicate in this document what the various facilities should do and the characteristics of the materials which lead to proper functioning.

Floors

In recent years there has been a rapid movement toward the use of carpeting, particularly in elementary schools. At first this was largely restricted to offices, libraries, and kindergartens, but more recently it has been extended to classroom floors and corridor floors. There is now strong reason to favor carpeting over conventional classroom floors because of the favorable psychological effect it has on pupils, because it eliminates nearly all of the harsh floor noise (from chairs sliding, pencils dropping, etc.) and a great deal of other distracting noise that is known to trouble many youngsters, because it facilitates the use of floor space for assembling pupils, because it is much more comfortable to walk on, and even because it is easy and economical to maintain. In a very real sense, many architectural innovations of the past decade, in the use of open classroom and of operable walls, can be traced directly to the functional superiority of carpeted floors. Therefore, in this school it is strongly recommended that carpeting

be used in the classroom equivalent areas, in the "common-learnings" areas, in the library areas, in administrative office areas, and of course in the kindergarten areas. (Incidentally, it is suggested that for a distance of about 15 feet inside doors which open to the playground, parking area, or sidewalk, a rubber mat either cover or replace the carpeting. Experience shows that water and mud stain the carpeting in such areas). For the science center and the "project areas", it is suggested that some material equivalent to vinyl asbestos tile be specified. For corridors and stairway landings, some material equivalent to terrazzo is suggested. For toilet rooms either a terrazzo type of material or ceramic tile appears desirable. For kitchen areas, locker rooms, and shower room spaces, a tile (perhaps such as quarry tile) appears to be satisfactory. For the cafeteria/auditorium either a hardwood floor or tile floor equivalent to vinyl asbestos has been found to be satisfactory. Generally in office and workroom spaces a tile floor equivalent to vinyl asbestos seems to function well. For the gymnasium a typical hardwood floor of narrow strips or perhaps one of the new compositions, such as tartan, is required. For the community room, either wood floor or vinyl asbestos floor is suggested.

Walls

The materials chosen for the outside walls and generally for the interior partitions of a school building are within the scope of the

architect's work. However, there are a few ideas which have been developed recently which are worth noting here.

Concerning fixed partitions in the interior of the building, the trend in recent decades has been toward the use of either brick or block walls carefully laid up and unplastered. In areas where these walls are sensitive to disfigurement, there has been a trend toward covering them with a spray glaze instead of the usual paint, and in place of installing a glazed tile or ceramic tile dado. In very recent years there has been in some cases the use of so-called pumice block left unpainted. Such an arrangement is definitely not recommended although some money may be saved by leaving out the paint on the interior partitions. The result is a very drab building and a complete failure to use color values in the enrichment of the child's environment.

Some years ago it was realized that in the lower grades in the elementary school in particular it was convenient to have what might be called tackable walls; in other words instead of having a well-defined bulletin board mounted on a wall, the entire wall surface might be of such a nature that children could use it for display purposes. The early arrangements were the use of a corkboard covering the wall or the construction of the wall surface entirely of softwood. Both of these arrangments, however, resulted in unsightly situations, since the corkboard surface soiled easily and was difficult to clean and the softwood surface did not have the power to heal the tack holes.

Subsequently, a way was discovered of carrying out the desired function in a much better manner. This resulted from the development of a vinyl wall covering mounted over some sort of a composition board. The vinyl wall covering (Vicratex or the equivalent) is washable and if a boucle

pattern is used, the tack holes are quite well hidden. Furthermore, the material can be obtained in a wide range of colors and it presents an excellent opportunity to develop bright and interesting color combinations to enliven the child's school environment.

Operable Partitions

There are a number of types of operable partitions which are now in use in school buildings. One common type is the accordion-fold partition which has a covering of fabric or plastic over a metal framework. This type sometimes has internal metal plates in the fold to increase its resistance to transmission of sound. This is a relatively convenient type of operable partition, manually operated and relatively inexpensive. However, it does not have a surface which will support chalkboard or tackboard. Modifications of this accordion type partition are available with wood slats or metal slats without a fabric or plastic cover.

Another fairly common type of operable partition is what is sometimes known as a coil wall. In these the partition is made up of wood or metal slats which can be coiled up at one side or above the opening. These coil wall partitions do not have a great deal of resistance to sound transmission.

A very useful type of operable partition is what is sometimes called the big leaf type. This consists of panels from three to four feet wide which are hinged together in various combinations. Sometimes a complete partition is composed of a series of panels hinged to fold in an accordion fashion. Sometimes they are hinged together in pairs or they even may exist as individual panels which can be locked together in place. These big leaf partitions can be obtained with mechanisms which seal them at the top and bottom and on the sides to the extent that they can be con-

siderably resistant to sound transmission. When they are hinged together to make up a complete partition, they are often obtained with an electrically driven mechanism.

Operable partitions have been suggested in this document for the wall between kindergarten rooms and for space dividers which supplement the fixed stub walls to divide the cluster space into closed classrooms. In similar fashion the science area and the project areas can be closed off. For these purposes it is suggested that the big leaf type partition is most appropriate particularly since it can be obtained with or without chalkboard, tackboard, or even pegboard on its surfaces. A big leaf partition is also the type generally used in dividing a gymnasium into two parts. For an installation of gymnasium size an electrically operated partition is desirable. It has also been noted that the stage for the cafeteria/auditorium is to be closed off so that it can be used for music instruction while the main part of the room is used for other purposes. For this installation also a big leaf type of partition is desirable.

In every case where the big leaf partitions are used without being motorized, it is desirable that a type be used which can be easily moved by a woman teacher. It also appears to be desirable that for closing off the classroom spaces the partition should be made up of sections of either two or three panels so that partial closure may be effected when desired.

Illumination

Over the long history of the development of school buildings there has been a great deal of study given to the matter of natural light in the

classrooms. In the earlier school buildings, particularly when they were built in a square shape, the original arrangement was to have two adjacent full walls of walls of windows to provide as much natural light as possible. In one-room schools, it was common to have windows on both sides of the classroom.

With the development of structures where the classrooms were strung along both sides of a central corridor, there could obviously be only one window wall in each room. Under this arrangment, because of the shadow cast by the hand in writing, it became a common prescription to seat the pupils so that the light came from the left. No consideration was given to left-handed pupils. In order to get as much light as possible into the classrooms, standards were set calling for a certain percentage of the floor area to be the minimum glass area in the window wall. A common figure for this purpose was 20 per cent.

In order that some of this natural light might be transmitted across the room to help the pupils seated near the inside wall, the codes called for high classroom ceiling. Not much trust was put in artificial lights, which in those days were not very efficient anyway. As time went on and artificial lights became better both in output and quality of light, however, more reliance became placed on them. In the 1940's the emphasis began to shift to the use of fluorescent lights and to greater dependence upon artificial lights for classroom illumination.

It is now common to go into a classroom and find the shades at least partly drawn with the class depending upon artificial light for its work. Furthermore, controlled light is by definition more even and reliable than is daylight with all its daily and seasonal fluctuations. The result has

been the questioning of the value of natural light and of the use of large amounts of glass in school buildings. As a matter of fact, there is no question but that in many cases the use of glass has gone much too far. In some school buildings where a large amount of window area has been provided, it has been found necessary to paint over some of the glass to eliminate glare and solar heat.

As a result some planners have gone to the other extreme, by constructing school buildings in which there are no windows in the classrooms. The comparative value in terms of psychological and visual comfort is still open to debate, and state codes which still require a certain percentage of floor area to be inserted as glass in a window wall for each classroom have generally been under attack. As a result many of the codes have been changed, but in some states there are still minimum requirements which have to be met by the architect. Even those requirements may tend to work against the best functioning of the building.

The Commonwealth of Massachusetts presently requires that six per cent of the classroom floor area in elementary schools be devoted to glass in an exterior wall Because of the flexible space envisioned for this school, it may be difficult to establish a correct figure, but presumably the floor area to be used in the calculation will be that of a classroom equivalent when closed off by operable partitions. *

Over the years, the designed intensity of the artificial light for classroom purposes has been continuously increased until today as much as 70 ft. candles upon desk or table surface is common. Almost all interior light is fluorescent for instructional spaces. We are told that the School

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* (We definitely recommend that the architect provide only as much exterior window surface as the law requires,)

Department policy calls for 50 f.c. for all but unusual situations, and we find no fault with this policy. Additional school lighting data is included on the following page.

—Levels of Illumination Currently Recommended for Specific School Areas. (Taken from Fig. 9-53, pages 9-76 through 9-86 of IES Lighting Handbook, Third Edition. Where exact area was not located, value determined from listed area with similar task.

AREA	FOOTCANDLES ON TASKS*
Auditoriums (See also Theatres)	
Assembly only	15
Exhibitions	30
Social Activities	5
Cafeterias	
Dining areas†	30
Cashier	50
Food displays	70
Kitchen	
Inspection, checking, pricing	70
Other areas	30
Classrooms	
Art rooms	70
Drafting rooms	100**
Home economics rooms	
Sewing	150**
Cooking	50
Ironing	50
Sink activities	70
Notetaking areas	70
Laboratories	100
Lecture rooms	
Audience area	70
Demonstration area	150**
Music rooms	
Simple scores	30
Advanced scores	70‡
Shops	100**
Sight-saving rooms	150**
Study halls	70
Typing	70
Corridors and stairways	20
Dormitories	
General	10
Reading books, magazines, newspapers	30
Study desk	70
First aid rooms	
General	50
Examining table	100
Gymnasiums	
Exhibitions, matches	30
General exercising and recreation	20
Dances	5
Lockers and shower rooms	20
Badminton	
Tournament	30
Club	20
Recreational	10

AREA	FOOTCANDLES ON TASKS*
Basketball	
College and professional	50
College intramural and high school with spectators	30
College intramural and high school without spectators	20
Volleyball	
Tournament	20
Recreational	10
Library	
Reading room	
Study and notes	70
Ordinary reading	30
Stacks	30
Book repair and binding	50
Cataloging	70
Card files	70
Check-in and check-out desks	70
Lounges	
General	10
Reading books, magazines, newspapers	30
Offices	
Accounting, auditing, tabulating bookkeeping, business machine operation and reading poor reproduction	150
Regular office work, reading good reproductions, reading or transcribing handwriting in hard pencil or on poor paper, active filing, index references, mail sorting	100
Reading or transcribing handwriting in ink or medium pencil on good quality paper, intermittent filing	70
Reading high contrast or well-printed material, tasks and areas not involving critical or prolonged seeing such as conferring, interviewing and inactive files	30
Parking areas	1
Storerooms	
Inactive	5
Active	
Rough bulky	10
Medium	20
Fine	50
Swimming pools	
General and overhead	10
Underwater	#
Theaters	
During intermission	5
During motion picture	0.1
Toilets and washrooms	30

*Minimum on the task at any time.

**In some cases it is necessary to use local lighting to supplement the general illumination. These cases are generally found where it is economically unfeasible to produce the recommended footcandle levels from a general lighting system. Quite frequently seeing tasks are on oblique rather than horizontal surfaces. This results in a reduction in illumination and a consequent loss in task brightness. Also, some of the seeing tasks are more difficult because the contrast between the paper and the printing may be very low. In both of the foregoing cases, supplementary illumination is sometimes required or indicated. Care should be used in the choice of supplementary lighting units, so that they will not direct objectionable glare into the eyes of any student. The distribution of the light across the working surface should be as uniform as is possible." (Page 11-21, IES Lighting Handbook.)

†If used also as a study hall a level of 70 footcandles is recommended.

‡When score is substandard size and notations are printed on the lines a level of 150 footcandles or more is needed.

#100 lamp lumens per square foot of pool surface.

There are two common elements in the control of daylight which have proved to be difficult. One is to shut it all out when the interior space is to be used for moving picture projection or other similar purpose. The other is to allow light to come in but to shut out the direct sunlight so that it does not present a glare situation to anybody within the space. Many things have been tried to handle this situation where it is found necessary to have windows on the outside walls of the classroom. The usual spring-loaded draw shades (vertical pull) do not fit tightly against the window casing to keep out all the light and, of course, they are easily subject to water damage and other types of wear and tear. The center-hung double-pull type shade presents the greatest flexibility in the control of outside light, but these shades are easily damaged.

The horizontal venetian blinds have some advantages in their use, but they are very difficult to keep clean and are also subject to damage and sometimes noisy. Vertical venetian blinds are easier to keep clean but are more subject to damage and generally are even noisier. Various types of glass block have been tried but have not been found to be the answer and are now much less to be found in new buildings. A number of types of horizontal draw curtains have been used. If made of cloth they are subject to sunburn, and if made of plastic the problems depend upon the nature of the plastic; sometimes they are too heavy to move easily, sometimes they are too stiff to drape conveniently, and sometimes they are subject to easy tearing.

Various types of overhangs and outside baffles have been tried. If large enough they are effective but somewhat expensive and generally awkward in appearance. Rooms lighted only by artificial illumination, if enough lumens are provided where needed, can be extremely satisfactory. There can be no universal recommendations that will apply to all school buildings inasmuch as the orientation of the building is a factor which affects the use and control of natural light.

Heat and Ventilation

State codes generally include criteria for the amount and kind of ventilation to be provided in the school buildings. These may be stated as so many air changes in a given period of time or that so many cubic feet of fresh or tempered air per child should be provided in a given period of time. Some of these codes are quite detailed and indicate the location of the incoming heated air, of additional radiation, and of the exhaust outlets. Many of these codes still include provisions based upon heating systems which were in vogue a long time ago, but generally there have been modifications to permit the use of newer arrangements.

It is not the purpose of this document to specify the type of heat or ventilation system that is to be used in this elementary school. However, there are certain functional criteria which have been derived from experience which are worth consideration.

It is obvious that the heating system should be flexible through zoned control so that various parts of the building can be maintained at a comfortable temperature while other parts may be heated only on a maintenance level. Thus, areas for community use will need to be heated in winter at times when the rest of the school may not be in session. Among the parts of the building which will need independent control are the office spaces, and the cafeteria/auditorium.

Other criteria for the heating and ventilating system are that it must be flexible enough to perform its function whether or not classrooms or

special spaces are closed off by operable partitions. The locker rooms for physical education facilities must be well ventilated. It is desirable that the equipment used in heating be unobtrusive in location and appearance. Above all, the fans which may be used for intake and for exhaust of air must be quiet or so located that they cannot be heard.

In this latitude, the trend toward air conditioning of school buildings has been less rapid than in warmer regions of the U.S.A. Generally, the extra cost has been avoided on the premise that school buildings are used only to a small extent in the summer months. However, since the new elementary schools in Boston are to be used for summer training programs and by the community in the summer time, it is essential that they be psychologically and physiologically attractive to the people in hot months. Additionally, pupils, especially at the kindergarten level, will probably be spending more time in the new schools than they have been accustomed to spending in Boston's present school buildings. In all likelihood, a longer school year as well as a longer school day seems predictable if present trends continue. Accordingly it is strongly recommended that the buildings be air conditioned.

Obviously some of the conditions applying to heat and ventilation will apply to the air conditioning. It, too, must be zoned so that in parts of the building not in use it may be cut off. It should also be easily adjustable and quiet in operation.

Communications

Within a school building there are various types of communication systems which are of importance. One of the most common today is the public address system. This is generally served by a console which can pick up from tapes, records, radios, or microphones origination from strageic points within the building. In an elementary school the public address console should presumably be located in the office suite, perhaps most efficiently in the clerical office or workroom. Microphones should be available in the principal's

office, in the clerical office, and in the cafeteria/auditorium.

Another common and essential system in a large school is the internal telephone system. This provides direct and private communication among members of the staff, both administration, special purpose, and instructional. It should not be expected that this service can be rendered by a "talk back to a squawk box" procedure.

Customarily in a school building there is an internal telephone in every classroom. However, in the school being described here it may well be sufficient to have one telephone station in each of the team centers (or equivalent) as well as in each office and each special purpose room such as the library, the teachers' planning spaces, the teachers' lounge, the physical education office, the health suite, etc.

For communication outside the building, schools and school systems have many different patterns. In some cases the school system itself is served by a central switchboard, manual or automatic. The suggestions from the Boston school offices indicate that each elementary school should have its own private line or lines and that the office of the principal should also be served by a second telephone with an unlisted number. Whether or not all the other offices will be served by separate lines or whether in general the school will be served by a multiple-trunk system is a matter which must be decided by the school office.

Because of the probable need for at least one pay telephone in the building, it is recommended that the architects include provision for telephone stations in an appropriate location.

Under the category of communications one might consider the television system; however, this will be considered separately in a later section of this document,

Water Service

Hot and cold water should be available at all sink outlets. Cold water at drinking fountains should be cool enough to be palatable, hot water should be hot and thermostatically controlled, and hot water at all outlets including shower heads should be sufficiently independent of the general heating system so that summer use will be economical and convenient.

To maintain cold water for drinking, wall-hung electric coolers should be used, particularly to avoid the necessity of continued running of "cold" water in order to cool it. It is suggested that in each house there be as many of these fountains as there are toilet rooms. They should be located near the toilet rooms but not in them. Similar fountains should also be installed in the Instructional Materials Center and in corridor space adjacent to the cafeteria/auditorium.

The water fountains which are installed for use only by the children should have a drinking outlet at a low level. Those which are used both by older children and adults as well as by the younger children should have outlets at two levels.

It has already been indicated that there should be counters and sinks available in all of the classroom-equivalent areas, in the science area, and in the project area. A work counter and sink should also be provided in the library workrooms and the teachers' planning spaces. These facilities should have a large double sink set flush into the work counter with cold and hot

water.

Electric Services

The world today is heavily dependent upon electric service. Proper design of electric lights and electric power service is important to the efficient operation of the school building. The total number of electric motors required for heating units, ventilator fans, pumps and educational equipment items necessary for a school may run into the hundreds. The level of desirable lighting intensity has been raised considerably as more efficient and economical lighting fixtures become available. Classroom lighting should usually have more than one switch bank. The electric lighting should be so designed that the chalkboards can be illuminated adequately and without glare. Where it is expected that chalkboards will be mounted on panels of operable partitions, it is evident that the general lighting level in the area where these will be used must be adequate. Corridor and stairway lighting should have convenient multiple switching.

The use of a great deal of motor driven equipment and projection equipment makes it essential that electrical outlets be provided in large number and at every convenient point. This will be somewhat difficult in areas which are bordered only by an operable partition.

Clock and Bell System

Elementary schools are not generally subject to the control of a sequence of bells and buzzers, but it is usually expected that there will be signals for the opening and closing of school and on an informal basis for many other special purposes. Accordingly a system of bells and buzzers needs to be installed.

Generally these should be, as far as the internal portion of the building is concerned, of pleasant tone and only loud enough to be heard where necessary. In each classroom equivalent and in the special instruction spaces and other special purpose spaces such as the teachers' planning space, library, the gymnasium, the cafeteria/auditorium etc., there should be clocks. The use of good electric clocks which may or may not be self-correcting from a central point master clock is recommended.

It is also expected that there will be a separate fire alarm system within the building. The requirements for this system as well as for the emergency lighting system for exits are set up by the state and need not be included here.

Acoustics

The problem of acoustics in this elementary school will be somewhat different from that in the traditional building because of the flexible use of space. It is expected that for a good deal of the time the operable partitions which separate the clusters into individual classrooms will not

be used, and the work of instruction of many groups will be going on at the same time in one large undivided space. For this reason it is essential that the control of sound be given very special attention. Whereas in the traditional school with closed-off classrooms either carpets on the floor or acoustic paneling on the ceiling are sufficient, in the large open spaces which are under discussion here it is probable that both carpets and other acoustical treatment of surfaces will be needed. Inasmuch as it is probable that the Cafeteria/Auditorium will be either rectangular or close to it in shape, this space will need acoustical treatment from another point of view, namely, some treatment that will make it possible to be heard clearly, without echoes, from the stage.

Colors and Finishes

The choice and use of color in elementary school buildings already has been discussed under several preceeding headings. Attention has been called to the fact that designers have become braver in recent years when it comes to the use of bright colors and have become more liberal in their use. There is a movement away from the use of one color combination for all the instructional spaces in the school building. Variously-colored chalkboards and tackboards, bright colored plastic in seats and desks, a similar variety in bookcases, counters and cabinets, and

the use of lighter and brighter colored floor tiles make it possible to develop many attractive color combinations to the end that there may be a variety of such combinations in a particular building.

Originally there was some opposition to the use of classroom furniture with metal framework that had been chrome plated on the theory that there would be glare from the bright surfaces. Any such phenomenon, however, proved to be harmless and the wearing qualities of the chromed metal have led to its widespread adoption in classroom furniture.

Color also has an important use in coding. It is suggested that the classroom desks and seats be color-coded for size in each house and that consideration be given to color-coding the classroom equivalent spaces for identification by the use of different carpet colors. The kindergarten rooms may have coded doors. Pupil clothing storage may be color coded for easy location of outdoor clothing.

Chalkboards

Until relatively recently the school chalkboard was almost universally made of slate although in some of the poorer schools it was a plaster or wood surface painted black. These dark light-absorbing surfaces contributed to the drabness of the environment in the older schools. However as educators and architects became concerned with the visual environment of the child at work, emphasis was given to the relative brightness of surfaces which came within the child's vision. Basically this resulted in an attempt to reduce the contrast between the brightness of the child's task and the immediately adjacent surfaces and between these two items and the general environment in the space in which

he worked. Obviously the black chalkboards did not fit well into the brightness balance. The first move was toward the use of green as a color for chalk writing surfaces and green chalkboards of many materials came upon the market. For schools equipped with slate chalkboards a green paint, which would leave a surface rough enough to take chalk marks, was brought into use to cover the black surfaces. Eventually, because many of the newer materials lent themselves to various colors, there was an introduction of a variety of colors into the chalkboard color patterns. For a number of years schools have used blue, brown, gray and green chalkboards. There has also been some movement toward the use of white or bright yellow or other very light colors for surfaces on which special crayons can be used.

One of the first new types of chalkboards to come into use was the glass chalkboard, particularly in green as a color. Some of these boards were subject to shattering, even in some cases spontaneously. Many types of green painted composition boards have been installed where price was a more important factor than quality or efficiency. One of the better currently available types is a sandwich of plywood or particle board between two thin faces of metal with a porcelain frit applied as a writing surface. This type of board also has the advantages of attracting magnetic holders. New materials for chalkboards are continually being developed, but the criteria to be observed are as follows:

1. The chalkboard should have a surface which is sufficiently abrasive to take chalk well.
2. The board should be smooth enough and sufficiently impermeable to clean well.

3. The chalkboard should be heavy and rigid enough and mounted with sufficient backing to eliminate vibration or resonance.
4. The chalkboard surface should be properly colored for effective contrast with chalk and minimum brightness contrast with the remaining visual environment.

The height of the chalkboard should conform to the size of the pupil using the instructional spaces. However, since an elementary classroom space may be used sometimes by groups of various ages in different years and must also be used by the teacher, there has been a tendency to use the wider board so that the chalk rail or its equivalent will be dropped to a level suiting the youngest pupils who will use the board, but with the vertical dimension of the board sufficient to accommodate older pupils and the teachers. This practice is recommended.

Tackboards and Display Areas

There has been a tendency in recent years to install more and more tackboard in elementary school classrooms. Until recently the best tackboard surface was a good grade of corkboard which could be obtained not only in brown but in other colors and for which the self-healing properties appeared to be unmatched. Composition boards and soft wood, as has already been stated, are not as satisfactory. However, a boucle pattern vinyl wall covering over a composition board has self-healing properties, is easily cleanable, and can be obtained in a variety of attractive colors. As a matter of fact, it is probably the best surface to use if one wishes a tackable wall or to have the tackable surface

brought down close to the floor. There has been a great deal of work given to the development of reversible or interchangeable panels of chalkboard and tackboard. However, if metal chalkboards are used, subject to the application of magnetic holders, the chalkboard surface may if necessary be used for display purposes.

Under the arrangement considered for the classroom equivalent spaces in this school it may be expected that because of the limited amount of fixed partitions and the substantial amount of operable partitions, many of the latter should be finished with tackable surface on both sides.* It is also desirable that tackboard surface be installed in conference rooms, teachers' planning spaces, corridor and lobby walls, at convenient points for posting notices in the physical education area, in the cafeteria/auditorium, in the teachers' planning space, in the teachers' lounge area and in the special instructional and the special purpose spaces.

There should also be a number of display cases in the building where projects carried out by the pupils may be exhibited. It is particularly appropriate that one or more of these display cases should be in the entrance lobby to the school or particularly in the administrative office area where the materials in them may be examined by visitors to the school.

Storage of Pupil and Teacher Clothing

It is recommended that storage units for pupil clothing be built into whatever wall space is available in the classroom clusters of this school. Hooks or pegs can be used within each stoarage unit on which to hang clothes. An upper shelf for caps and a lower shelf for rubbers and overshoes is suggested. The storage space should be behind doors, and tackboard is recommended for the outer surface of these doors.

Each teacher should have her own lockable closet in which to store her clothing. This closet should be located as close to her teaching station as is practical.

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* See however page VI-12

GEORGETOWN ELEMENTARY SCHOOL

SPACE AND USE PROGRAM

June 12, 1969

O	SPACE	UNIT	AREA	COMMENT
	DERGARTEN			
	Classrooms	1200	4800	Arranged in 2 pairs
	Storage	100	400	
	ER HOUSE			
	Classroom Equivalents	800	6400	Arranged in 4 pairs
1	Team Center Storage	300	300	
1	House Storage	300	300	
1	Reading Laboratory	600	600	
1	Teachers Planning	500	500	
1	Special Classroom	800	800	
1	Storage for Special Classroom	50	50	
2	Common Learnings Areas	1000	2000	1 for each Team Center
1	Projects Area	1000	1000	
1	Science Area	600	600	
	PER HOUSE			
12	Classroom Equivalents	800	9600	Arranged in three-room clusters
2	Common Learning Areas	1500	3000	1 for each Team Center
1	Projects Area	1800	1800	
2	Team Center Storage	300	600	
1	House Storage	300	300	
1	Reading Laboratory	600	600	
1	Teachers Planning	500	500	
1	Science Center	1500	1500	
	Advanced Classroom	900	900	Adjacent to one of the U.H. three-room clusters
	Storage for Advanced Classroom	50	50	
	RARY			
1	Instructional Materials Center	2500	2500	
1	Office	150	150	
1	Workroom	200	200	

GHTOWN ELEMENTARY SCHOOL
AND USE PROGRAM
2

June 12, 1969

SPACE	UNIT	AREA	COMMENT
VISION			
Television-Technological Center	400	400	
C ROOM			
Music Room	600	600	Divisible, adjacent to cafe/auditorium
Music Room Storage	100	100	For chairs, risers, stands, etc.
Office for Music Room	120	120	Next to Music Room
Music Room Storage for Instruments	100	200	
TERIA/AUDITORIUM			
Cafeteria/Auditorium (including serving area, 200 sq. ft. storage)	5500)		
Stage (including wings, 2 storage rooms of 100 sq. ft. each)	700)	9200	
Kitchen and Allied	3000)		
UNITY ROOM			
Community Room	2400	2400	Near gymnasium
Storage for Community Room	200	200	
Office for Community Room	120	120	
ASIUM			
Gymnasium (104 x 70)	7300	7300	
Gymnasium Storage	150	300	1 each end; large doors
Physical Education Offices	200	400	With toilet, shower, lavatory, room for 4 locker-storage areas
Locker Rooms	600	1200	
Shower Rooms	300	600	
Supply Rooms	100	200	

June 12, 1969

.	SPACE	UNIT	AREA	COMMENT
MINISTRATION				
	Principal	200	200	With closet, adjacen to clerical space, 2 doors
	Assistant Principal	150	150	With closet, adjacen to clerical space
	Conference Room	300	300	Adjacent to Principa Office
	Clerical Work Room	400	400	
	Office Reception Room	300	300	
	Office Supplies, Storage	120	120	
	Vault	80	80	
	Office Staff Lounge	120	120	
	Storage	120	120	
	Guidence and other offices	150	600	
ALTH CENTER				
	Office, Reception, and Storage	200	200	
	Examination Room	100	100	
	Cot Rooms	80	160	With adjacent toile
ACHERS' LOUNGE AREA				
	Dining Area	500	500	
	Faculty Room	400	400	
	Women's Lounge	200	200	
	Men's Lounge	200	200	
	TOTAL ABOVE		66,940	
	NET PROGRAMMED AREA		66,940	
	Allowance for circulation, wall thickness, mechanical, custodial, receiving, toilets, etc. x 1.4			
	GROSS AREA		93,716 s.f.	

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